Practical Chiropody

E. G. V. RUNTING

FOURTH EDITION

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PRACTICAL CHIROPODY

Press Opinions

of previous editions of "Practical Chiropody"

Medical Times :

"It is based on an experience extending over forty years and is well worth reading."

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Nursing Times :

"All chiropodists practising the profession in a scientific spirit should be grateful to Mr. Runting for this gold mine of detailed practical information."

PRACTICAL CHIROPODY

BY

E. G. V. RUNTING, F.I.S.Ch.

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PREFACE TO THE FIRST EDITION

THIS work cannot claim to be a complete Text-book, but it has been written in the hope that those who are studying the subject may find it will assist them in their studies and increase the sum of their knowledge ; and that even those who are already in practice may find some help and guidance in its hints and suggestions, which are the outcome of over forty years' experience.

If there is one point more than another upon which I feel impelled to lay great stress, it is this : that no matter what amount of theoretical and scientific training the reader may have undergone, the proper enucleation of a Corn, the treatment of Nails, etc., cannot possibly be accomplished without considerable study of detail, and that the particular deftness and dexterity of hand, which are so necessary in operating, can only be acquired by continuous actual practice.

It is, unfortunately, a fact that there are many who profess to treat affections of the foot without having undergone proper preparation, study, and practice, and it is these people who bring discredit not only on themselves, but on the profession. On the other hand, there are now men and women who are so effectively trained in theory and practice that even public Institutions are beginning to appoint them to attend their Staffs.

This work has been compiled chiefly from notes of lectures given at the School of the Incorporated Society of Chiropodists and from the Author's contributions to the Theoretical Course for Practising Chiropodists taking the Society's examinations.

Grateful acknowledgment is here made to A. W. Oxford, M.D., B.Ch. (Oxon.), and J. M. H. MacLeod, M.A., M.D., C.M., F.R.C.P., for permission to quote from their books, and to Norman C. Lake, D.Sc., M.D., M.S., F.R.C.S., to whose teaching I am so greatly indebted.

My thanks are due to Messrs. H. K. Lewis & Co., Ltd,. for their permission to use a modified copy of the diagram illustrating the component parts of the Nail that appears in Dr. Macleod's " Handbook of the Pathology of the Skin ".

I should also like to acknowledge the assistance which I have received in the compilation and arrangement of this work from Mr. G. F. Bacon.

E. G. V. RUNTING

1925

PREFACE TO THE THIRD EDITION.

In this, the third edition, the work has been carefully revised throughout; some sections have been re-arranged; and new matter has been added, including illustrations and descriptions of new forms of replaceable pads.

An endeavour has been made in the Appendices to put on record a digest of terms and areas of the foot more frequently used by Chiropodists, with the view of assisting the compilation of descriptive notes, and of forming some kind of ground work upon which others may improve.

E.G.V.R.

November, 1928

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Chapter I

CORNS

No matter what aptitude a Chiropodist may show in dealing with general affections of the foot, or what operating skill he may have developed, there can be no doubt that one of his greatest assets is the capacity for being able, cleverly and painlessly, to enucleate a corn.

A corn is a pathological consequence following on a normal reaction to intermittent pressure ; those people who do not use shoes at any time are protected against the wear and tear to which their feet are subjected by a responsive thickening of the skin, caused by an organised effort on the part of Nature to adapt the skin to existing demands. This thickening is brought about by the deeper layers of the epidermis being stimulated by *intermittent* pressure and friction to create an excess of cells.

This protection is realised in the case of the rowing man who, at the beginning of the season, usually finds his hands chafed or blistered, but, in course of time, is able to row for hours owing to this provision of Nature. Again, the bricklayer, by the development of an extra thickness of skin is able to handle rough-edged bricks and toss them from hand to hand, while others can manipulate heavy packing-cases and heavy weights—such as chains—without injury to the dermis owing to

this adaptation of Nature. The phrase "horny-handed sons of toil" is by no means a misnomer—it has its existence in fact.

In all these cases there is no sharp line of demarcation between the callous and the surrounding skin, but there is a general blending of the thickened cuticle.

Nature endeavours to throw out this type of protection locally when boots are worn and certain joints are more prominent than others, and the thickening will probably exist for quite a long time without causing inconvenience to the subject and then only when it becomes excessive by reason of its bulk. As the feet for generations have been protected artificially, there is a tendency to flexion of the toes. This contraction brings one or more of the joints into undue contact with the leather of the boot, which has caused a leading authority to give, as a definition of a corn, "A localised Tylosis, occurring where there is intermittent pressure from without and solid resistance from within."* The pressure of the flexed knuckle against the leather of the boot has the effect of compressing and moulding the thickened cuticle into a more or less sharp-pointed concentration, the actual shape of which depends upon the contour of the resisting body. And so begins the process which develops the pathological condition known as a corn.

Sometimes, owing to the irritation produced by direct contact with the soft tissues and involved nerves, the actual process of development of a corn may be one of

* P. S. Abraham.

its most painful periods. After a time, however, the continued irritation of this point causes Nature to proliferate protective cells as a species of sheath, thus, in a way, lessening the severity of the contact of the point on the more sensitive tissues.

But until this sheath is complete the induced hyperæmia and increased nervous activity cause greater sensitiveness. Immediately below the point of the corn the papillæ become more or less flattened, while the surrounding papillæ are increased in size.

In many cases there is a single cone-like concentrated depression which is the primary cause of pain ; in others there may be two or even three points ; or the concentration may take the form of a ridge or crescent, the configuration being determined by the relative pressure of the shoe on the surface and the contour of the bone below.

The word CORN is derived from the Latin *cornu*, a horn. There is a Greek synonym Heloma (from *helos*, a nail). In a work entitled " Practical Podiatry " (Greek *Podos*, a foot), published by the First Institute of Podiatry, in New York, there is an illustration of two nails which were used by the Chaldeans in building about 2,000 B.C. These nails were called " *helos*," and were made of cone-shaped pieces of stone, much resembling the point of a corn. The term HELOMA, therefore, has been adopted to describe a corn, the suffix *oma* is used in medicine to describe a tumour or a swelling. The Latin word CLAVUS = a nail, is also a good descriptive term.

Corns may be classified according to their appearance, texture, or position, as follows :—

A. The usual HARD Corn (Heloma Durum) which has just been described.

B. VASCULAR (Heloma Vasculare).

C. NEURO-VASCULAR (Heloma Neuro-Vasculare).

D. SOFT (Heloma Molle).

E. SEED (Heloma Miliare).

B. *Vascular Corns.* In this condition there is complication of the epidermis which takes the form of minute particles of the true skin, or corium, being forced up to the surface between corneous nuclei. So it is possible that the vascular papillæ have become pressed up to the surface between the corneous ramifications. The term VAS, a vessel, implies the character of this development.

C. *Neuro-Vascular.* The last-mentioned condition may be additionally complicated by the minute nerve-endings becoming involved, hypertrophy of these terminal nerve filaments resulting. Needless to say, this condition is extremely sensitive to the touch and demands most careful manipulation. In appearance it shows small concentrated corneous growths interspersed with yellowish-white lines and occasional pink spots which indicate the vascular tissue. Sometimes the yellowish-white lines are not clearly visible. This particular condition is more often found in moist skins.

D. *Soft.* This name is applied to that variety which is found in situations where skin is in contact with skin, e.g., between the toes. The formation of this development is caused by intermittent pressure, plus relaxation due to deposit of perspiration owing to the deficient evaporation of sweat. These corns are often characterised by ring-like indurations, the edges being the most concentrated part of the growth. Owing to their situation they present a macerated whitish appearance. The most usual spot, and probably the most difficult to clear, is on the webbing between the fourth and fifth toes. In these cases it will be found that one or both toes are flexed in such a manner as to bring into direct contact two joints which, if the toes were in their proper position, would not be so directly opposed to one another.

In other cases there may not be a great accumulation of macerated callous, but a minute point in the folding crease at the base of the inner side of the fifth toe, and this should be searched for when the patient complains of pain, with little or no superficial evidence of a corn.

Soft corns may also be found on the internal aspect of the first phalangeal joint or possibly on the phalangeal or the distal joints of the smaller toes. It should be noted that in all these cases, in addition to flexion, there is axial rotation of the toe which brings about contact at an oblique angle ; and nearly all these corns are characterised by the ring-like indurations.

Often the appearance of the centre indicates the formation of a small bursal sac.

E. *Seed.* This type is unique in character and consists of small nuclei about the size of a millet seed. These are usually multiple and may be distributed more or less uniformly over any part of the plantar surface of the foot. They have the distinctive characteristic of occurring virtually irrespective of pressure and are found more particularly on very dry skins, especially with people of mature age. In some cases small crystalline bodies may be found involved in the nuclei. The heel and plantar arch of the foot are often the principal seat of this trouble.

It should be noted that some corns more than others, from pressure, or perhaps from the more sudden action of a blow, are liable to produce extravasation of blood in the underlying structures, and as this may be absorbed into the contiguous layers of the corn, there may be a red discolouration, approaching sometimes in mature cases almost to a blackness. This condition has been classified by some as Blood Corn, which is not correct ; it is merely incidental to the ordinary corn impinging on the surrounding vascular tissue.

Mention has been made of Nature's effort to protect the soft tissues from some of the effects of the corn by creating a lining of the cavity with a layer of cells to diminish the effect of the traumata. This is of great importance to the Chiropodist as, although the corn may be cleared away, so long as that nucleus or sac retains its form, repeated development is likely to ensue.

Again, the pressure of the apex of the corn will sometimes bring about a rupture of the underlying tissue which rather takes the form of the small sac, as is described by Sir John Bland Sutton in writing on "Adventitious Bursæ" :—

> "When the skin moves over joints or hard prominences, the intermediate connective tissue becomes torn or ruptured, thereby leading to the formation of spaces in which fluid collects. The boundary walls at first are irregular and are formed by adjacent connective tissue. Finally, this becomes smooth and forms the sac-wall."

Although this passage refers in detail to adventitious bursæ as they form on other parts of the foot, to a great extent it very aptly describes the type of condition which, in many instances, occurs in the dermis beneath a corn. In mentioning chronic cases of corn in his work "A Treatise on Corns, Bunions and Diseases of the Nails," written in 1845, Mr. Lewis Durlacher describes this condition under the heading "A Sac, or Sheath." Indeed, the term "Sac" is a most apt description of this development.

It will be seen from the foregoing paragraphs that the complete cure of a corn depends entirely upon the restoration to the normal of the underlying tissue. The lining sac must be obliterated and the depressed papillæ restored to their more or less normal dimensions. This can be achieved by two or more different methods. If

a corn were removed from the foot of a person who, for some other reason, was confined to bed for a lengthy period, the filling-up of the cavity would be brought about by nature's own effort. Again, if the patient were still using the foot, and perfect protection were assured by a sufficiently easy shoe and proper padding, the addition of a stimulant to the cavity would be, in most cases, all that would be needful to ensure restoration.

A very old method of restoring the tissue is practised by the East Indians. Having first pared the callous of the cavity down to the softer tissue, the operator produces a horn tube which he inserts into the depression and then by suction creates a vacuum, replacing his tongue, which he has used as a stopper, by a piece of wax with which he skilfully seals the top of the tube, and leaving the tube hanging on the patient's foot for probably an hour.

This particular method when used on a larger scale is known in therapeutics as Bier's Cupping Process for inducing passive hyperæmia. At the end of about an hour it will be seen that there is a slight exudation of blood and serum through the thin tissues and the adherent cells on the end of the tube, which on removal will show the effects of the extravasation of blood. It is needless to observe that if this process were adopted by a proficient Chiropodist the tube would necessarily have to be of glass properly sterilised and fitted with a rubber tube and bulb at the end, such as is used in Bier's method. The author has not had an opportunity of

ascertaining how many patients have had their feet infected with septic matter by the Indian horn tube, but he is able to say that so far as the removal of the corn is concerned this process is in many cases effective.

The writer has found that it is possible, providing proper protection is afforded, to bring about complete enucleation and normal replacement by carefully removing the corn at the first visit, immediately treating the cavity with Nitrate of Silver (50 per cent. solution), using a palliative compress (such as Boric lint saturated with equal parts of liquid extract of Witch Hazel and distilled water, covering it with rubber tissue at night) if deemed expedient. At a subsequent visit, which should take place within three or four days, the cavity should be again cleared and it may be found necessary to repeat the treatment once or even twice more. It will be found that the Nitrate of Silver by its stimulating action promotes hyperæmia and by its combination with the albumen of the tissues induces concentration of the cavity, thus enabling the removal of the lining sac more completely to be effected.

In a most interesting treatise entitled "The Radical Cure of Corns and Bunions," Mr. E. Harding Freeland, F.R.C.S., draws attention to the tendency of a corn to recur. He says :—

> "Where the sac part of the growth from which it is reproduced is left behind a tendency to recurrence is inevitable."

He advocates, therefore, the free excision of the entire growth in order to effect a permanent cure, the underlying bursa, if existent, also being excised. Mr. Freeland states that "he removed several corns piecemeal" and found "it was not possible to remove more than the horny layer without giving rise to considerable pain." Here it may be suggested that with continuous practice, such as comes to a properly trained Chiropodist, it ought to be possible to remove the entire corn and even to obliterate the lining sac without giving pain.

And perhaps it would not be inappropriate at this stage to call attention to what might be termed the "Chiropodist's Handicap." Suppose that a surgeon should decide that a radical operation upon a toe should be performed; for example, that a corn should be completely excised. He orders the patient to bed to keep the part entirely free from use and pressure, so that after the operation recovery is largely assisted by Nature and is in no way mechanically impeded. Now, the patient, prior to arrival at the stage where he or she would submit to operation, will have suffered a good deal and would be likely, at all events for a time, to render obedience to the surgeon's injunctions respecting the type of shoe hereafter to be worn. It should be noted that even after a radical operation subsequent care as regards foot covering is very essential, for it is not at all impossible that in course of time there may be a formation of minute corns on the cicatrix of the wound.

But mark the difference where the Chiropodist is concerned. The part upon which a corn forms is usually the point of intermittent traumata : there is flexion and the joint moreover is exposed to more than average wear and tear. After manipulation by the Chiropodist success is very dependent upon how far he is successful in ensuring freedom from the actual cause of the discomfort and from the factors which occasion it. Take the case of a person weighing, let us say, ten stone. At each step he or she is exerting a momentary and recurring pressure of 140 pounds, and this goes on in most cases under treatment. The advantage, let us say the success, of the Chiropodist depends entirely upon his being able to obviate this pressure upon the affected part after his manipulation, and the manner in which he can best tackle and overcome this handicap is dealt with in the section on Padding which appears in this volume.

The methods of enucleating Helomata generally adopted by Chiropodists may be classified under the following three headings :—ENTIRE DISSECTION ; PARTIAL SECTION ; MINUTE SECTION.

Entire Dissection. This method has numerous advocates in America and is considered by many to be a very popular operation, but it has but few adherents on this side of the Atlantic. It consists in removing the growth in its entirety in the following manner :—The free edges of the heloma are grasped with a pair of " mouse-tooth " forceps, and are raised sufficiently to enable the operator to sever the soft tissues from the corn in the exact line

of demarcation, enough traction being used on the forceps to overcome the pressure of the cutting instrument which, for this purpose, is usually of the chisel type, although some use an ordinary scalpel. When properly performed the gentle lifting of the callous and the cutting-away can be carried out in such a manner that there is no drag or pressure upon the surrounding nerves. It is needless to say that this requires very great practice and beginners are always given instruction in dealing with helomata on the sole of the foot as being the easier type of corn to enucleate by this particular method. The result should be that after the tissue has been carefully cut away from its periphery, the corn is taken out absolutely entire.

Partial Section. In this second method a beginning is made by paring away the surface in such a manner as to remove entirely the superficial and surrounding callous so that the central concentration or concentrations only are left to be dealt with in much the same manner as in the first-named process. The cutting instrument is worked round the edge, the nucleus grasped by the forceps, and carefully raised and severed from its surrounding attachment until the whole comes away.

Minute Section begins with the paring process as described in the preceding paragraph, but instead of raising the corn from the soft parts with the forceps small sections are deftly lifted out by a cutting process, the skin being held in a state of tension, until a complete clearance is effected.

All methods of enucleation consist of some variation of these three instrumental processes and are applied to all types of corneous development. The chief aim of the manipulator, of course, is to remove the offending points painlessly and effectively; and never for one moment must the constant observance of antisepsis be relaxed.

In some cases chemicals are used to impregnate the keratinous cells and cause exfoliation, i.e., the separation or the falling-off in layers. Among the principal chemicals used are Salicylic, Acetic, and Lactic acids in varying forms of preparation. Of these Salicylic acid is that most generally employed, usually with an ointment base, or combined with Collodion, in the form of plasters, or even occasionally as a powder. When callous is thoroughly impregnated it increases in bulk and can be loosened from the underlying strata by the operator. In some cases this effect is facilitated by soaking the foot in hot water. The resulting exfoliation does not always bring away the nuclei, but this can be effected the more easily by the Chiropodist in the usual manner. Most of these preparations of Salicylic acid contain some additional ingredient which tends to lessen the sensibility of the surrounding tissues to the action of the acid. Indian Hemp (Cannabis Indica) used to be very popular, but latterly Creasote has come to be considered the more effective. It is obvious that the vital spot in corn-removal is the point of fission; and that the degree of pain depends upon the prevention of drag or pressure on nerves involved in the area.

One general principle must be observed in operating. Although the epidermis and the corneous developments are in themselves insensible structures, pressure or pull in the act of manipulation cannot fail to bring pain to the patient, so that the chief object of the skilled operator is to be able thoroughly to remove excrescences without disturbance of the surrounding vascular and nervous tissues. In order to achieve this the operator must always ensure tensity of the area. Any "rocking" movement during the process of enucleation is certain to entail stress upon the surroundings of which the nerves make the patient aware. Maintaining the tension should be the work of the left hand. With callosities it is very often only a matter of lessening such an excess of development as is causing discomfort, particular heed being given to any tendency to induration or to incipient heloma. It should be borne in mind that callous is often useful as a protection and there are occasions when its removal is detrimental rather than beneficial. It is advisable, after its removal, to paint the part with weak tincture of Iodine and to cover it temporarily with plaster, until the tissues are adapted to the new conditions. If the patient does not complain of discomfort, and there is no evidence of something forming that is likely to be troublesome, there is great virtue in avoidance of Chiropodial interference. It is not desirable that a patient should afterwards remark, "That part of my foot was quite comfortable until it was attended to, but it has troubled me since." The old proverb, "Let sleeping

dogs lie," often holds good in Chiropody, although it is the Chiropodist's duty, if he sees something forming which is likely later to trouble the patient, to warn him and leave it to him to decide whether or not it should be disturbed.

The old-fashioned theory of clearing away the nuclei or points and leaving all the surrounding callous as a protection to the denuded area is now exploded, it being recognised that the cavities and surrounding walls do not maintain the same contour for long after the operation. The edges which were intended for protection are compressed into an induration which, in itself, is a source of pressure and discomfort, so that the corns will again rapidly develop. Moreover, when the surrounding callous is left untouched, it is quite possible that other minute points concealed beneath it may be left untreated and so continue to be a source of discomfort to the patient.

A more complicated type of corn is Heloma Vasculare. That is the condition of hypertrophy of the epidermis which occurs where there are a number of nuclei between which an intensely vascular corium approaches the surface, so that there may be a series of minute corns between which hypertrophied and elongated Papillæ are squeezed upward. The term " Vascular " is used to express this condition because in these papillæ are the little blood-vessels. (Vas=a vessel.) In some cases, in addition to this vascular dilatation there exists hypertrophy of the terminal nerve filaments. In other words, those papillæ which contain nerve-endings may

also be involved, and to such a condition is the term Neuro-Vascular applied. It is obvious in cases of this kind that a very small amount of paring might be sufficient to abrade the ends of the elongated papillæ, so that it needs the most delicate manipulation on the part of the Chiropodist when he proceeds, as he should do almost immediately, to enucleate separately these minute points. In some Vascular cases it is almost impossible at the first operation to do more than prepare the case for the next visit.

Effort should be made to constringe or destroy the vascular tissue by one or other of the following agents :— Nitric acid, Trichloracetic acid, Nitrate of Silver (fused stick), strong solution of Copper Sulphate, or the same agent in crystal form. These chemicals are more or less drastic escharotics, which, by rapid oxidisation, obliterate the intervening papillary tufts, and so facilitate complete removal of the nuclei. Nitric acid is strongly corrosive and will often bring about the desired effect by one application. It may be more or less a painful process and, if necessary, could be followed in half an hour by the use of the compress of Boric lint saturated with Witch Hazel and distilled water in equal parts as a palliative. A slower and less painful process would be Trichloracetic acid which should be used once a day for two or three applications. Nitrate of Silver is often painless ; Copper Sulphate can be used daily for about a week. The same agents can be used for Heloma Neuro-Vasculare, but it might be necessary to employ

them in a diluted form in extremely bad cases. In soft corns the most concentrated part of the development is more often to be found in the bordering edge of the growth, usually in configuration to the contour of the joints, and it is usually white in colour. The principal objective in enucleation should be the indurated ring which forms round the head of the bone and is the chief cause of pain. It is obvious that a large-sized scalpel or cutting instrument is ill-adapted for working between toes, owing to its liability to cut the soft surrounding tissues, so that the most popular type of instrument is the hatchet-shaped or "golf-club," or that known as the "Soft Corn Spoon."* In addition to the antiseptic for cleansing the part and used before working it is sometimes desirable to paint the part with Compound Tincture of Benzoin (Friar's Balsam). This gives the necessary "tackiness" to the surface, so enabling the operator to use the cutting instrument effectively (as, owing to the macerated condition of the part, it is not easy, without some such aid, to obtain a proper grip.

Also in the fourth web there is often found a very minute corn in the crevice of the creasing-line deep down at the base of the small toe. It almost takes the form of this crevice and is, therefore, not easily detected; but it can be a source of great discomfort to the patient. Whenever there is a complaint of pain between the toes, it is essential that the creasing line should be explored for this almost concealed corn before seeking for some

* See page 153.

other cause. Many operators find a 25 per cent. solution of Nitrate of Silver useful as an after-dressing where there is a moist skin, especially if the case is again to be treated after a short period. A 25 per cent. Salicylic acid ointment is also useful for preparing the part for a second operation. It should be applied to the part and covered with sheep's wool and the case seen again, if possible, within four days. On the other hand, if an opportunity does not occur of clearing out within a short time, it is desirable not to use this ointment owing to its tendency to produce cell-hypertrophy. In such a case it might be well to use the 25 per cent. Nitrate of Silver solution. In suggesting this particular agent it is assumed that there is a moist skin as is the case with most soft corns. With a very dry skin the use of Nitrate of Silver is not advisable. Sheep's wool plays an important part in "cushioning" between toes when treating this particular condition. It should be wound loosely in sufficient quantity round either the fourth or fifth toe so that it does not slip. In addition to those chemicals already mentioned, powdered Boracic acid and some form of alcohol—such as Eau de Cologne—can be advised for patients to use themselves.

In the section on "Padding," reference is made to methods of counteracting the displacement of the bones which is often the primary cause of soft corns. Interdigital corns of any kind—for example, on the distal joints of the toes pressing upon the adjacent phalanges—would come under this heading and often have the

characteristic ring formation and are dealt with in the same manner.

Clavi Miliares, as already mentioned, are distributed over the plantar surface of the foot, apparently irrespective of pressure. If softened with a little Liquor Potassæ for five minutes before working, they can be picked out by a fine-pointed instrument. In some cases it is desirable to prepare the parts by applying a 5 per cent. Salicylic acid plaster which should be renewed, if possible, daily. In the course of three or four days the nuclei can be more readily picked out. Sometimes it may be sufficient to keep the same plaster on for the whole period. Results are usually satisfactory, especially if the patient can be induced afterwards to keep the skin bland by the use of an emollient, such as Lano-Cyllin ointment or something of the type of the Glycerine and Cucumber lotion.

Too much emphasis cannot be laid upon the fact that where flexion of the toes has exposed some prominent part to additional pressure, on that particular spot corns are most frequently formed. In the majority of cases the usual spot, when artificial foot-covering is used, is the little toe. Here, generally, it will be seen that there is a tendency for the apex of this toe in its contraction to turn obliquely towards its neighbour, the fourth toe, in such a manner as to cause automatic "bulging" of the first phalangeal joint, and here is the common area for the formation of corns. In addition there is often found on the outer aspect of the

apex of the little toe, in the neighbourhood of the nail, a minute corn, which is generally the cause of great discomfort, especially as the toe is so often turned under in such a manner that the whole weight of the body falls on it in the act of walking. When very close to and involving the integument of the nail it is sometimes a little difficult to distinguish this growth, which is aptly described by Durlacher as a "concealed" corn. To ensure anything like a permanent cure restoration of the toe to the normal after operating is essential. The plantar toe-prop mentioned in the section on "Padding" is here an obvious necessity. The same type of corn may be found on the fourth or third toes, and the second phalanx is also subject to apex-corns, although on a slightly different aspect; with a hammer-toe tendency they may be found immediately on the end of the toe, under the end of and not infrequently at the side of the nail.

Corns may be found in the neighbourhood of the great toe-nail, either in the nail-groove or directly under the nail-plate in the region of the anterior third of the toe. Usually, this condition is accompanied by that mal-alignment often described as hyper-extension of the toe, in which the distal phalanx has dorsi-flexion, thereby causing the dorsal aspect of the toe to press the nail against the upper leather of the boot. If the upper part of the shoe brings unequal pressure to bear upon the nail area, formation of sub-ungual clavi is the usual consequence. The putty-like appearance of this corn

under a transparent nail is apparent to the naked eye. Carefully to pare away or reduce with the electric drill the surface of the nail-plate immediately covering the heloma is not a difficult task, after which the corn can be enucleated in the usual manner. These details are referred to under "Nail Affections" where the distinction in appearance between the sub-ungual clavus and the sub-ungual exostosis has been made clear.

Attention may here be drawn to the fact that occasionally the distal joint of the second toe may be the immediate source of pressure on the enveloping soft tissue surrounding the nail (the nail-wall) of the great toe. The result of this pressure, especially if there is ribbing of the nail-plate, is to produce corns in the immediate nail-wall or in the sulcus. Few agents facilitate the removal of these minute corns and the surrounding callous so well as Liquor Potassæ. The cavity should first be cleansed with Hydrogen Peroxide (10 vols.) and the Liquor Potassæ retained in the sulcus for five minutes or longer before operating. A 3 per cent. solution of Salicylic acid in spirit is an excellent cleansing and neutralising agent after removal of the corn. It is hardly necessary to remind the reader that packing the nail-groove, as in cases of onychocryptosis, is the most appropriate final proceeding. Of course this condition necessitates the use of the inter-digital wedge.

In cases where there is acute flexion of the proximal and plantar flexion of the distal phalanx of the big toe,

the long extensor tendon is sometimes liable to stretch its aponeurosis, this causes the tendon to be elevated in such a manner as to receive more than usual friction or pressure from the boot-upper, and makes it liable to produce a corn literally on the tendon itself which may need very careful attention. The method of enucleation of corns in this particular region does not vary in any material degree from the process of removal from other parts. It may be desirable to advise the patient to keep the part bland by the use of a suitable emollient, such as liquid Iodex, or Lano-Cyllin ointment. In " Padding " there will be suggested suitable protection for this condition.

Another rather unusual seat of corn trouble is the superior aspect of the os calcis, or heelbone, at the insertion of the Achilles tendon. Sometimes a bony enlargement may be found in this region upon which, owing to irritation caused by the stiffening material of the shoe, a painful corn may be formed. This is often complicated in winter-time by Chilblain and the recurrent inflammation caused by this irritation is liable to bring about permanent enlargement. After palliative measures desirable protection can usually be afforded by judicious padding and attention by the bootmaker. Dilute Burow's Solution, which is usually so effective in inflammation involving the covering of the bone, would be an appropriate compress; while Iodex ointment or Crooke's Collosol Iodine Oil would be useful when inunction is desired. If the condition of

the skin permits, painting with the weak tincture of Iodine once daily for six or seven days would be simple and effective.

Chapter II

INFLAMMATORY AFFECTIONS OF THE TISSUES OF THE FOOT

As inflammation appears in so many affections of the foot it may not be out of place to give a summary of its phenomena.

Inflammation* has been defined as the succession of changes which occur in a living tissue when it is injured, providing the injury is not of such a degree as to destroy at once its structure and vitality. It has been more briefly defined as "the response to injury" or "the reaction to irritation." The clinical signs of inflammation were stated nearly 1,900 years before the definition was given. They are heat, redness, swelling, pain and impairment of function—*calor, rubor, tumor dolor et functio laesa.*

Heat is due to the increased amount of blood flowing through the injured part. It should be noted that the temperature never rises above the temperature of the blood in the heart. Redness and Swelling are due to the increased amount of blood and to its exudation into the inflamed area. Pain is due to the engorgement of the affected area, which leads to pressure on the nerve-endings. The pain is often throbbing, the beats

* From the Latin *inflammo*, to set on fire.

corresponding to the arterial pulsation. The pain can be temporarily relieved by pressure on the artery which supplies the part with blood. On the other hand the pain is increased by pressure on the part. It is pressure which causes the difference in pain as an inflamed hand is raised or lowered; if it is allowed to hang down the pain is increased, if it is raised the pain is relieved Loss of Function is due to pain, to the difficulty of using a swollen limb, and also to the direct paralysing effect of the poison which has caused the inflammation.

Inflammation is generally due to the presence of bacteria, but may result from a variety of causes, e.g., blows, burns, acids, caustics. Experiment has determined the actual phenomena of inflammation in the vessels:—(1) A contraction of the arterioles, followed almost immediately by (2) A dilatation, first of the arterioles, then of the veins and capillaries. (3) Increased rapidity of the blood-flow, followed gradually by (4) Retardation, which may even lead to a complete stoppage of the local circulation if the irritation is sufficiently intense.

At the same time, there is a change in the relations between the vessel-walls and the constituents of the blood. The leucocytes fall out of the main stream and collect along the walls; the red corpuscles also tend to adhere to the walls and to each other, forming rouleaux. There is also a marked increase in the exudation of blood through the vessel-walls, which is usually accompanied by an escape of red corpuscles from the capillaries

and a passage of the leucocytes from the capillaries and veins towards the site of irritation. The leucocytes attack the bacteria, ingest them, and either destroy them or are themselves destroyed. The emigration of the leucocytes to the site of irritation has been described as " Positive Chemotaxis."

When the invasion is severe, a large number of the attacking leucocytes are destroyed and disintegrated, while the tissue may break down under the influence of the poison. The result is the conversion of the exudation from the vessels into a thick opaque fluid called pus ; the process is called suppuration. Pus, therefore, consists of the fluid-exudate together with dead and living leucocytes, red corpuscles, bacteria, and the products from the broken-down tissue.

When inflammation is the result of a non-bacterial cause, it often ends in Resolution, i.e., subsidence of inflammation without abscess or ulceration, with dispersion of swelling. The circulation in the vessels is resumed and the part restored to its natural condition. This process is very rare in a bacterial inflammation, when a local destruction of tissue almost invariably results. In this case the restoration of the part is produced by the budding of new capillaries from the old ones in the neighbourhood and the appearance of a large number of cells called fibro-blasts. There is produced in this way a tissue called granulation tissue, which is soft and highly vascular.

(The foregoing notes are based, with the author's

permission, upon an article by Dr. Oxford in "The Chiropodist," July, 1916.)

It seems appropriate here to describe the conditions involved in the case of a septic corn. There are the usual symptoms of inflammation, accompanied by tensity of the skin, consequent upon the swelling, and the patient complains of intense throbbing in the part. When the condition permits of the removal of the corn, there follows an exudation of pus from the abscess underneath. This should give immediate amelioration of the pain. The cavity should first be fomented with hot sterile water and then irrigated with Hydrogen Peroxide (10 vols.); or the foot can be placed in a basin containing equal parts of each. It is desirable that the orifice be kept open until the pus has been fully discharged, and this can sometimes be assisted by the insertion of a wisp of antiseptic gauze to facilitate drainage. Of course, if the foot has to be used, the cavity should be carefully guarded by sterile antiseptic gauze in order to prevent the entrance of other micro-organisms which would further complicate the condition. Needless to say, there are phases of this trouble which it may be advisable to report to the patient's medical attendant. It is hardly necessary to point out that all the instruments which have been used in this operation should be boiled before they have a chance of coming in contact with anything else, and that all wools, swabs, and dressing details should be burnt before they can spread contamination.

There may be inflammation of the sac which has

already been mentioned as being seated beneath the apex of a corn, and also of the small fibrous bursa which covers the points of friction on a joint. A distinguishing characteristic of inflammation of the fibrous bursa over a joint is that on removal of a corn there may be found an oozing of a small quantity of clear viscid fluid which in appearance is not unlike Glycerine or white of egg.

Sometimes in these bursæ the contents do not force an outlet and are confined in the bursal sac or purse. In that case presence of fluid would be evinced by fluctuation and occasionally the sac itself can be felt by the fingers, so distended are its walls. This condition may be reduced by painting with tincture of Iodine to cause the absorption of the fluid. In the more acute stage, however, the fluid escapes and forms a sinus, working towards the surface of the skin, and on removal of the corn it may escape.

It will be observed, therefore, that the difference between infection which manifests itself on the removal of the corn, and in bursitis which can be revealed in the same way, is that in the former condition the pus is thick, white, yellow, or opaque, while the products of bursitis or synovitis are viscid, but clear.

Inflammation of an area surrounding a corn may specially affect another subjacent tissue. The pain may be of a lancinating (piercing, cutting) character, instead of throbbing, and may sometimes be felt more directly at the crest of the dorsum of the toe than immediately underneath the corn. This often indicates inflammation

of the covering of the bone (periostitis). Such a condition may yield to dilute Burow's Solution, to Sub-Acetate of Lead lotion, or, as in other acute stages, to Antiphlogistine.

Chilblain

Another inflammatory process to which the skin of the extremities is peculiarly subject in winter is Chilblain* (Erythema Pernio), which is a reaction to cold usually affecting parts farthest from the centre of the circulation, namely, hands and feet and, more rarely, ears and nose. This condition is usually found in persons with weak superficial circulation or defective blood-coagulability, and it is noticed that children and females are more particularly susceptible.

The first effect of cold is to contract the small terminal blood-vessels, thus driving the blood from the surface. Should there be only a short interval before the blood returns to the surface, and the normal flow is resumed, there may be no injury to the part. Should the cold, however, be accompanied by moisture and be sufficiently severe it may so temporarily paralyse the terminal nerves which constrict the blood-vessels that the latter remain distended. This is followed by an exudation of serum into that area, which becomes swollen and afflicted

* Chimatlon, a Greek word, signifying " severity of weather," is sometimes used to describe Chilblain, and in the American text-book, " Practical Podiatry," the condition is classified as Chimatlon Mild ; the more severe condition known as Frost-bite is termed Chimatlon Severe.

with itching and tenderness, especially when brought near the heat of a fire. The congested part is predisposed to excoriation and then may occur the condition known as broken chilblain.

In the treatment of chilblain everything should be done to facilitate free superficial circulation. Well-blocked, roomy boots or shoes of soft leather should be worn, with stockings or socks of a smooth material ; coarse texture, whether of wool or cotton, should not be used. The stockings should be made of a fine wool and it may be found that this is the best type of foot-covering. However, it is important to recognise that there are some cases where woollen foot-coverings appear to conduce towards the production of the complaint. In such cases, Balbriggan, a type of woven cotton, is often very useful, or a mixture of silk and wool might be used. It is a mistake to wear two pairs of stockings or socks, but where in the country, for instance, it is expedient or preferable that a stocking of a coarse or heavy type of wool should be worn, it may be advisable to wear next the skin a thin, smooth cotton "socklet."* This preserves the surface of the skin without causing flexion of the toes which is so often the result of drawing one sock over another. It is an advantage loosely to entwine sheep's wool round the base of the toes fairly thickly to provide greater freedom for the ends of the toes and to

* An article, shaped rather like a slipper, which covers the toes and extends to the instep, and which can be obtained at most hosiery stores.

prevent direct contact of the toes one with another. It is not advisable to wear patent leather or rubber shoes. Foot-wear should be frequently changed. Relief can be obtained by rubbing susceptible parts with Iodex and powdering with borated Talc, or by using this Talc with friction without the Iodex. Weak tincture of Iodine is also useful in dispersing congestion in the early stages.

If there is much tensity and the skin shows signs of breaking, it is advisable to use compound tincture of Benzoin as having a soothing and astringent action. It should be allowed to dry thoroughly and then be powdered. This treatment can be applied two or three times daily.

Dr. Whitla gives, as one of the best applications for Chilblain, the following recipe :—℞. Compound Tincture of Benzoin—two drachms ; Vaseline—four drachms ; Zinc Ointment to one ounce ; mix. Another useful remedy :—℞. Resorcin—ten grains ; Balsam of Peru—one drachm ; Unguentum Calendulæ—seven drachms ; mix. There is a special advantage in the use of these balsams as they are tissue-builders and encourage granulation. Both these formulæ can be used for chilblain in the early stage and also when they are broken, and should be rubbed gently into the affected parts two or more times daily, or applied spread upon lint. Another form of treatment in the unbroken stage is to apply a compress soaked in the following lotion :—℞. Acetate of Lead—sixty grains ; Tepid Water—eight ounces ; mix. This should be kept on for an hour or

more, the parts should then be thoroughly dried and dusted with the following powder :— ℞. Acidi Tannici—ten grains ; Camphor—ten grains ; Zinci Oxidum to one ounce ; mix. This stimulating and astringent preparation is given by Dr. MacLeod.

Broken chilblain must always be treated with great antiseptic precautions. The feet may be fomented with or immersed in equal parts of Hydrogen Peroxide and hot water that has previously been boiled. This may be followed by the application on lint of Subitine, a preparation of Subitol (a synthetic Ichthyol), with Glycerine.

The late Dr. Lewis Jones, head of the Electro-Therapeutic department of St. Bartholomew's Hospital, had great success by the use of a small Faradic battery (such as the Spamer), in the following manner :—Two basins containing warm water, to which a little salt (about a teaspoonful to a pint) has been added, are placed close together on the ground. One foot and one terminal of the battery are placed in each basin and the current set going and regulated to a strength which can be comfortably borne by the patient for about twenty minutes night and morning. This can be carried out by patients themselves, and it has the effect of stimulating the peripheral nerves. The writer has seen many cases of complete prevention or absolute cure by the use of this method. There is no reason why this electric treatment should not be carried out in conjunction with one of the ointments and drying powder already mentioned. As the whole content of the little dry cell battery in this

machine is only about two volts, it is one of the few electrical apparatus that may safely be used by an untrained person. Other forms of electricity, such as the high frequency, are often very successful, but should be carried out only by specially trained operators. There are some cases which it is advisable to refer to a medical man, who may decide to give internal treatment such as Cod Liver oil or some form of Calcium. The latter tends to increase coagulability of the blood.

The ill effect of the use of excessively hot water is referred to in another part of this work. It is distinctly harmful in chilblain subjects, as even after several hours have elapsed the skin of the feet may not have recovered sufficiently to resist the other extreme of temperature felt when contact is made with the pavement or ground out of doors. The chief object should be to maintain a medium temperature of the whole body and its extremities; this cannot be done by opening the pores through soaking in very hot water, or by going to the other extreme in the use of very cold water.

Curiously enough, a proper combination of these extremes is often a desirable method of stimulating the circulation, and in some cases of indifferent circulation is of much benefit: The procedure is as follows:—Two basins or foot-baths are arranged side by side on the floor, one being supplied with hot and the other with quite cold water. Each should have a handful of rock or common salt dissolved in it. The feet are first placed in the hot water for a few minutes until they are well

warmed. They should then be plunged into the cold water for four or five seconds and back again into the hot water. This should be repeated about ten times, putting the feet for about five seconds into each basin, beginning with the hot and finishing with the cold water. Then the feet should be well rubbed with a bath-towel, sponged with spirit and powdered, especially between the toes. The effect of the hot water induces a flow of blood to the surface of the skin and the cold forces it back again ; thus the circulation is gradually improved by the ebb and flow of the blood. This " revulsive " foot-bath can be used with advantage as a prophylactic measure against both Chilblain or cold feet.

Toes chronically affected by chilblains are liable to corns rather of the multiple, minute " Seed " character.

It should be noted that Erythema Pernio is by no means the only type of combined redness and swelling of the skin which may be seen in odd patches on the foot. Chiropodists are apt sometimes to be puzzled by finding this condition, accompanied by heat, throbbing or possibly itching, occurring in the summer months. This state, however, may be independent of that induced by chill and is a local symptom of the existence of nerve disturbance and affection of the blood vessels. Should it not yield to painting with weak tincture of Iodine and covering with soap plaster, it would rather point to this cause and, if the patient is not already under treatment by a medical man, the Chiropodist might suggest that he should consult one.

Chapter III

VERRUCA PEDIS

(Wart of the Foot)

This troublesome affection of the foot, which has come before the Chiropodist in increasing numbers, especially of late years, is frequently called Papilloma. Although it might be considered a papillomatous growth, there is a tendency to abandon the name and in preference to use other terms. According to Dr. MacLeod, in his "Pathology of the Skin," these lesions are not the result of proliferation of the papillæ, but are caused by an overgrowth of epidermis. They consist of a circumscribed thickening of the prickle-cell layer (Acanthoma), with irregular growth of the inter-papillary process and corresponding elongation or irregularity of the papillæ.

It seems appropriate here to point out that, normally, the cells are germinated in the basement layer of the epidermis, the columnar cells of which are superimposed upon the papillary surface of the dermis, and have been named the "Mother-cells." In the ordinary way these cells go through processes of metamorphosis and are pushed towards the surface of the skin until fully developed into horn cells. But in that pathological condition of which we are now treating, these "daughter" cells, which should normally pass through these changes,

take on the function of mitosis. The germinating layer of the skin is, as it were, the basal layer of the epidermis (imposed upon and between the papillæ), from which all the cells of the skin normally are produced. This and the next stratum are composed of soft opaque cells which are continually being pressed up from below and appear to be interlaced with thread-like processes which convey the impression of prickles. These are the particular strata of the Rete Malpighi in which the disorganisation known as Verruca seems to originate.

There is, apparently, no doubt that verrucæ originate in some sort of local irritation, although unquestionably there are constitutional conditions which produce them. Some authorities consider that verruca is often accompanied by a deficiency of the lime salts in the blood. It is certainly the case that the rapidly growing youth of both sexes is peculiarly subject to this trouble, and that probably the general lowered vitality and strain during the War brought about that impoverishment of the blood among adults which is so favourable to the complaint, and therefore has caused it to be much more manifest than has before been the case.

Verrucæ are contagious and inoculable, but facts rather suggest that those who have been cured of warts on the foot are seldom liable to their recurrence. This suggests the possibility that an " anti-body " is created in the blood. Some authorities declare that bacteria are present in these growths, the bacillus Porri being quoted as the particular germ which is always found.

Again, that verrucæ can be produced from secretive sources is suggested by the fact that those who are in the habit of handling the carcases of animals, etc., are frequently subject to them. Continuous thermic irritation has been quoted as likely to bring about lesions of this character. It is certain that the X-rays which are used as one source of cure for warts can also, through continuous exposure of the insufficiently protected hand to the rays, bring about a serious condition of the skin which is accompanied by warty growths. It is also a well-known fact that chemicals can and do produce this form of development. In dye-works trouble of this kind often arises. Then there is no doubt that trauma is one of the factors, especially in the foot, which gives a local cause to these formations.

It will have been noted that so far we have been speaking generally and merely touching upon some of the general causes of verrucæ, so now we must confine ourselves to local causes and effects only so far as the foot is concerned. Among predisposing local causes might be mentioned protrusion of a nail through the inner sole of the shoe; the continuous use of rubber-soled shoes in hot weather, when the rubber is in close proximity to the skin; the continuous and over-use of hot water; indeed moisture in any case unquestionably favours development. Pedic warts are not very different from the ordinary type, except that generally they are flat and usually painful. Mostly they attack the fleshy parts of the foot, the plantar surface of the

metatarso-phalangeal region and the same area of the heel. But they may occur in other parts of the foot and are occasionally met with on the dorsum of the joints in the usual position of ordinary corns, at the apex of the toes or even under the edges of the nails. They present two particular characteristics, arida (dry) and humida (moist).

The general objective symptoms, i.e., the appearance they present to the eye upon examination—are that on clearing away the surface by paring there is disclosed a spongy or muffin-like growth which shows the ends of elongated papillæ combined with the hypertrophied accumulation of soft cells. As a consequence of the rapid proliferation of the cells of the Rete Malpighi the papillæ are so crowded by the accumulating cells that they become attenuated and squeezed upward and downward, their contained capillaries becoming virtually obliterated, although in some cases these capillaries are still enclosed in their papillæ. As evidence of this there may be on paring slight hæmorrhage from the centre of the growth. The sponge-like surface may also be dotted here and there with small dark red or blackish stains, and the growth has rubber-like consistency.

The subjective symptoms, i.e., those elicited from the patient, are a history of throbbing pain, more especially on first lowering the foot to the ground after the night's rest and/or on first putting on the boot in the morning, and on immersion of the foot in hot water. After the boot has been worn for some time the pain may be

somewhat ameliorated ; probably the compression of the shoe drives the blood from the part and lessens nerve activity.

An aid to diagnosis, should there be any doubt, would be found in the Nitrate of Silver stick, which should be rubbed well into and around the growth. When the case is next seen, which should be within the following three days, after clearing the surface, the small tube endings will have become much more apparent and clearly differentiated from the ordinary skin, for the Silver Nitrate combines with the albumen of the tissues in such a manner as to show up this detail in black and white.

When verruca is present only on one spot, it is always advisable to make minute examination of the rest of that foot and its fellow, always bearing in mind that this complaint is auto-inoculable and is quite likely to affect other parts of the skin. Often spots may be found in close proximity which may possibly spread and eventually coalesce.

There are numerous methods of treatment, the majority being directed towards destruction of the growth and the bringing about of a reaction, Coagulation-Necrosis (clotted death), which results in the rejection of the diseased part by the healthy tissue. It is highly desirable that the tissue should be destroyed and the natural reaction of the normal underlying tissue—that is, the line of cleavage between the burnt dead and the living tissue—brought about as quickly as possible. Certain authorities on the subject have pointed out that

there are cases where continuous ineffective irritation in treatment is liable to convert a benign into a malignant growth, especially in people of mature age where there is a predisposition towards the latter type of affection.

The following processes of extirpation may be mentioned :—

Excision. Surgeons will sometimes excise the whole growth together with sufficient of the surrounding area in order to prevent the possibility of any diseased cells being left in the foot, the wound receiving treatment in the usual way.

Electricity. Fulguration and Electrolysis. As these processes require a special course of study, they need not be here described.

Freezing, with Carbonic Acid Snow—the Carbon Dioxide Pencil—is considered by many to be a convenient method of extirpation, but this also requires special study, particularly in regard to the exact time and method of application, for if used by the inexperienced, the after-effects may be detrimental.

The use of Radium or X-Ray is sometimes successfully resorted to in cases of verruca.

Acids and Alkalis. The majority of Chiropodists bring about the desired result with acids, such as Nitric, Acetic, Monochloracetic, Trichloracetic, Salicylic, Chromic, Pyrogallic, or Acid Nitrate of Mercury ; or with such powerful alkalis as Potassium Hydroxide or Sodium Hydroxide.

NITRATE OF SILVER has already been mentioned as an aid to diagnosis and although it is not strong enough in itself as a rule to carry out the necessary treatment, it can be used to make a margin around the growth as a protection against the action of an acid on a normal skin and so obviate the necessity of a ring of vaseline or adhesive plaster. After coagulation necrosis has been brought about, the fused point would probably be the best agent to touch any suspicious spots that might appear to be fibrous.

NITRIC ACID is probably the oldest and most popular escharotic. By its action rapid oxidisation of the part is produced resulting in an eschar (a hard crust or scab caused by burning). Where the opportunity offers, it can be used daily, being applied by the operator with an appropriate piece of wood, an orange stick, for instance, and working the acid into the growth. Some Chiropodists prefer an interval of two days between applications, the surface of the growth being removed each time to encourage penetration. It is always desirable for the operator to hold a small pledget of absorbent wool in his other hand ready immediately to mop up any excess of acid should it show a tendency to run over the adjacent parts. One objection to the use of Nitric acid is the visible fumes of the liquid as it is being applied, which sometimes alarm the patient. Some operators advocate merely roughening the surface in order to facilitate the application of the acid upon each occasion, without removing much of the growth, but,

on the whole, removal of as much of the destroyed growth as is practicable so lessens its dimensions that the irritant covers less of the surface on each subsequent occasion.

In regard to treatment by these chemicals it must be impressed upon the Chiropodist that he should make a special study of each particular escharotic until he has fully mastered its working, as each has its own peculiarity of chemical action.

Monochloracetic and Trichloracetic Acids result from the action of Nitric acid on Chloral Hydrate in varied proportions. The crystals are liquified by just sufficient water as is necessary for the purpose. These acids are modern and very effective remedies which have a more rapidly penetrative power than Nitric acid and bring about reaction more quickly. The application of Monochloracetic Acid is sometimes painful, but not greatly so. The method of application is similar to that of the Nitric acid and can be repeated every two or three days.

Trichloracetic Acid is a safe caustic and one which can be used by the patient when longer intervals between expert treatment are unavoidable. It differs from Monochloracetic acid in that it requires more frequent application and is less drastic in its action. This caustic can be applied twice daily during the intervals between attendances provided that the patient has been cautioned not to allow the acid to spread beyond the growth.

But, should the patient be unable to attend at least once a week, it would be well to dilute the acid solution by adding an equal quantity of distilled water. It will be noticed that the effect of Trichloracetic acid is a greater toughening of the part than is produced by the other acids. Should the operator find difficulty in working this, a little Liquor Potassæ applied before operating is a help.

Salicylic Acid in different preparations and fuller strengths is useful in the removal of verrucæ. In many cases it will act painlessly, but there are exceptions. Occasionally the case needs to be finished with some more potent agent such as Nitric or Trichloracetic acids. One of the forms in which Salicylic acid is used as a caustic is the ointment, sixty per cent. in Diachylon (Ungt. Plumbi Oleatis.). This hard base is considered the best as it does not spread so easily over the adjacent parts. A piece of adhesive felt, appropriately graded, having a perforation the exact size of the growth is applied to the part in such a manner that the growth alone is exposed ; a portion of the ointment is then placed on the growth. The entire dressing should be protected by adhesive plaster, thus sealing in the ointment. The process should be repeated every four or five days. Of course, the destroyed tissue should be cleared away each time before re-applying the ointment. Salicylic acid is also made up in Collodion in combination with Indian Hemp or Creasote. This preparation should be painted over the affected part twice daily and the case treated

in a similar fashion, so far as the removal of the exfoliating tissue is concerned.

A preparation of this acid in spread plasters may also be found useful as an alternative to the ointment and Collodion paint. Salicylic acid and Creasote Mull plaster (Unna) usually contains one grain Salicylic acid and two grains of Creasote to the square inch. This has a destructive action on verrucæ and should be placed directly over the growth or growths without overlapping the surrounding normal tissue. The entire part should afterwards be covered with a protective plaster to prevent the Mull slipping from its place.

An ointment which is not so much used, but the value of which is becoming increasingly recognised, is a preparation of PYROGALLIC ACID in a Vaseline base. This was brought to the notice of Chiropodists by Miss Anna Moyde Savage, a practitioner of Syracuse, New York, who advises its use in a thirty per cent. strength. The author has found this very useful, although he prefers to use a fifty per cent. strength in unguentum Resinæ. These preparations are virtually painless and so commend themselves in the treatment of nervous patients. The application of this particular ointment may be renewed twice weekly, or it can be left on the growth for a week. The usual occlusive precautions should be observed.

The ACID NITRATE OF MERCURY used by some Chiropodists is effective, but as it is a violent corrosive, great care is needed in its application.

Watery solutions of CHROMIC ACID in various strengths

are favoured by some operators. A solution of 100 grains to one ounce of water is strong and acts as a powerful oxydising agent, but it must be carefully used, as in contact with alcohol, Glycerine and some other organic substances it forms an explosive mixture.

When ALKALIS, instead of acids, are used, greater care must be taken owing to the fact that their attack on the verruca is not easily confined to the actual growth ; they have a tendency to diffuse themselves and affect the surrounding tissues.

POTASSIUM HYDROXIDE is mostly found in deliquescent sticks or pencils which may be reduced to fluidity by exposure to the air or by the addition of one or two drops of water. Operators who use this agent generally favour the method of working it into the growth with an orange stick for five minutes or so and afterwards neutralising its effect, before plastering, by swabbing with dilute Acetic acid or vinegar, repeating the process every other day until the desired reaction is brought about.

CAUSTIC SODA (Sodium Hydroxide) is used in the same way.

It should be noted that the object of all these applications is to destroy the growth so thoroughly that such a reaction may be created in the healthy tissue as to bring about a line of cleavage between the destroyed growth and the normal healthy tissue. The culmination of this process is usually accompanied by effusion of serum or sero-pus, the fluid making the separation. The whole art of the successful destruction of verrucæ depends upon

inducing this condition effectually without causing more disturbance to the normal tissue than is actually essential to the cure.

Sometimes there is slight ulceration as a result of the escharotic treatment, but with the removal of the growth, the cleansing of the cavity and efficient palliative treatment should soon induce healthy granulation. Irrigation of the cavity with Hydrogen Peroxide (10 vols.) as a preliminary would counteract germs that might be present. This could be followed by a dressing of twenty-five per cent. Ichthyol in Glycerine, or of a similar preparation, which is on the market combined ready for use, known as "Subitine." This can be placed in the cavity, covering the part with a little Boric wool, on which in turn should be placed several layers of Boric gauze and the whole held on by plaster. If, however, the case can be seen within the next twenty-four hours, the cavity may be closed in with stockinette plaster (Zinc Oxide Elastic Cotton). For those Chiropodists who prefer the use of ointment a good alternative dressing is composed of Balsam of Perú, one part, to Ung. Zinci Oxidi, two parts. This has a bland yet mildly antiseptic action.

On the return visit, which should, if possible, be made within three days, the cavity should first be again washed out with Hydrogen Peroxide and then carefully explored for any possible remains of the verruca. Any doubtful spots should be touched with Nitrate of Silver and the cavity be kept under observation until perfect granulation

has taken place. If the growth has been thoroughly and completely destroyed this is generally a rapid process.

Occasionally there are cases where the final coagulation-necrosis may set up a certain amount of disturbance and consequent pain to the patient. The author has found it sound policy to anticipate and discount any such disturbance by informing the patient of its possibility, and giving him some Boric wool or lint with a small quantity of oil silk, and suggesting he should keep it at hand. In case there should be any increase of pain, relief would be obtained by dipping the wool in hot water and applying it as a wet compress. It may be even worth the operator's while, if the process has been giving severe pain, to anticipate the coagulation-necrosis by suggesting the use of Antiphlogistine applied hot as directed to the whole area for one night. This will reduce the inflammatory condition if the escharotic has already been used for some time, and may have the effect of inducing effusion of serum below the growth. In any case, it may so far soothe the affected part as to make it easier to carry on the treatment.

It has already been pointed out that among the various causes of verruca, whether occasioned by secretion or by chemical irritation, etc., a predisposing cause might be trauma. The part should therefore not be subjected to undue pressure or friction, and according to the situation of the growth, nicely graduated pads should be used as a protection to the affected region.

The Zinc Oxide felt lends itself peculiarly well to this purpose. For example, if the trouble were on the heel, a medium sized piece should be shaped and well bevelled in such a way as to cover the entire heel, and then a graduated perforation made in the felt corresponding to the size and position of the growth. With such a pad treatment might be carried on without removing it on each occasion, operating and dressing the parts through the aperture. If along the tread of the foot (the metatarso-phalangeal region), a round pad fixed immediately proximal to the heads of the bones would lessen the body weight on the affected area. The same might apply in varying degrees to other parts of the foot, always remembering that any pad which covers a part should be bevelled to its thinnest towards the distal extremity of a joint or toe, and be of such a breadth and adaptation as to relieve the pressure on the foot, without undue compression of the centre.

In view of the nature of these cases it is undoubtedly of great value that the Chiropodist should make a point of explaining to the patient in a lucid manner the nature of the development, and give some idea of the possible number of attendances that may be necessary. In order to cultivate the patient's confidence it is sometimes an advantage to specify the cost of the treatment, explaining perhaps that an inclusive charge could be made for the cure, irrespective of the number of visits that might be necessary. This would relieve the patient's mind if the case happened to take longer than was at first anticipated.

The practitioner could then confidently ask the patient to continue his visits until a satisfactory result was brought about. It is always advisable for the operator to have very clearly in his own mind a definition by which he can give the patient a distinct idea of the difference between this particular growth and the other more corneous affections. He should also be able to explain quite clearly this pathological condition of the Stratum Malpighi, and that in order to make a thorough cure it is essential to destroy every single cell that is infected, and should intimate that although this may entail a systematic course of treatment, the effort is justified by the fact that once properly and thoroughly cured, the verruca is unlikely to recur in the same individual. Whenever possible, it is an advantage to see the case about a fortnight after the final dressing, thereby making sure that the restored striæ indicate a normal skin.

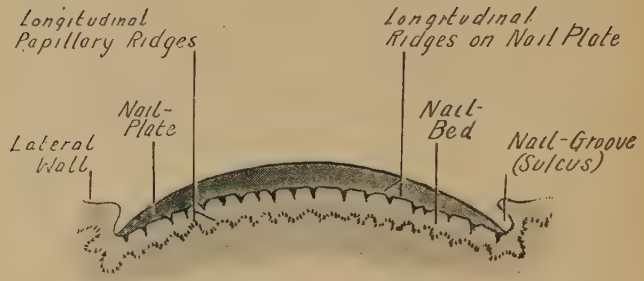


FIG. 1—NAIL PLATE (TRANSVERSE SECTION)

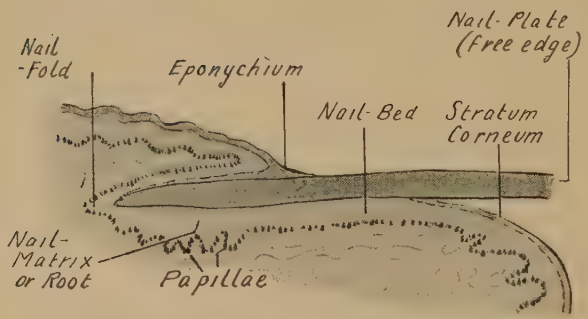


FIG. 2—NAIL PLATE (LONGITUDINAL SECTION)

PLATE I.

COMPONENT PARTS OF THE NAIL

Chapter IV

NAIL AFFECTIONS

To obtain a good grasp of this subject it is necessary briefly to refer to some of the anatomical detail of the formation of the nail. Reference to the diagram will show the different sections of this appendage to the skin. There is the horny structure known as the nail-plate, which develops from the posterior part of the nail-fold; this fold overlies the nail-plate, under which is the matrix. It is in the matrix that the nail cells are germinated from behind and underneath, adding to and pushing forward the nail-plate in the process of development.

That part of the nail-fold which forms the matrix is often called the root and is distinguished by having beneath it very large papillæ. As the plate grows forward beyond the germinating area it is less intimately related to the vascular tissue beneath, and the under-surface is ribbed and runs in grooves upon the supporting structure known as the nail-bed, so that it might almost be said to be here dovetailed into the nail-bed. It will be noticed that in certain deformities where there is separation it is the forepart that becomes detached from the nail-bed, and it is apparently not detrimental to further development of the nail structure, as this takes place entirely in the matrix.

Fig. 1 shows the sulci or nail-grooves which receive the sides or lateral borders of the nail. This part, which is so important to the Chiropodist, is often the seat of pathological conditions, such as nail-groove corns, inflammation and ingrowing of the toe nail (Onychocryptosis).

SHORTENED OR DEVELOPING NAIL

It is to be noted that when fully grown the distal or free edge of the nail rests on a development of the epidermis which maintains it at a higher level than would be the case in the immature structure. The above shows the nail when newly developing. (Note the lower level at which it grows forward until it reaches the end tuft.) The nail-plate also would take this sunken position should it by accident or by the inexperienced hand be cut much shorter than its normal length. Dr. MacLeod, in his " Handbook of Pathology of the Skin," alluding to this horny layer of the pulp of the toe which passes upwards and comes in contact with the free edge of the nail, draws attention to the fact that the raised supporting area can be demonstrated, for instance, " by pressing the pulp of the finger against any resistant body, when

the line of junction will appear as a yellowish curved band under the free edge."

At the dorsal extremity of the nail-fold which overlies the nail-plate there is a little callous film-like layer of cuticle, extending over the body of the nail for a short distance, known as the eponychium. (Note the development of larger papillæ in the matrix at the base of the nail for the purpose of proliferation of cells, Plate I., Fig. 2.)

It is scarcely necessary to remind the reader that this appendage to the skin fulfils two functions: firstly, as a protection to the ends of the distal phalanges; secondly, as a resistant point to facilitate the feeling and grasping of objects with the fingers, and in the toes the degree of pressure against the ground. While they are actually enveloped in the artificial foot-covering it has to be realised that the toes would possibly be more comfortable were they unprovided with nails, for the "blocked" end of a properly shaped shoe would give the necessary protection from above, and it is certain that many types of modern shoes are so shaped that the nails by their solid resistance increase the pressure on the toes.

Nails, by their markings, generally register internal disturbances. The skin is always affected in cases of fever, and in certain severe types its occurrence is recorded on the nails by transverse ribbing. White markings are often due to traumatic causes, such as the too-vigorous pushing back of the adherent cuticle (eponychium), or the use of a steel or equally hard

instrument at the base of the nail. Similar indications may also be due to local manifestation of nerve trouble. These are known as Flores Unguis or Leuconychia and have the appearance of those white patches often seen underneath that kind of ice known as "cat's" ice. This form of Leuconychia is stated to be due to the presence of air between the cells below. In cases of severe trauma, such as the impact which occurs when the big toe is forcibly "stubbed" against an obstruction, or the falling of a heavy weight on the matrix, there may occur a break in the continuity of the nail growth, followed by a renewal of the development. The new portion would burrow beneath the old section of nail and that part, as it pushes forward, would be thicker as it virtually doubles the usual thickness, and thus produces transverse ribbing. The inequality of bulk caused by this ribbing as it grows forward often produces an abnormal thickness in the sulcus and possibly a small and painful nail-groove corn. This is especially evident on the outer border, where the nail wall (vallum unguis) is pressed against the edge by the distal joint of the second toe.

In addition to transverse ribbing the nail is also subject to longitudinal ribbing due to atrophy or defective nutrition. This type of marking is more noticeable as individuals grow older and especially in those prone to Neuritis, or Rheumatism, or in those of Gouty diathesis. This affection, because of the friability of the nail, is likely to have a good deal of

influence in cases where the nail has splintered owing to improper cutting.

Under the heading "Nail Dystrophies," Dr. MacLeod, in his "Diseases of the Skin," describes Longitudinal Striation as follows:—

> "One of the first evidences of imperfect Nail growth may be an accentuation of the longitudinal Striæ normally present. Sometimes the longitudinal ridges are coarse and separated by furrows, or there may be a single median ridge which may divide like a Y two-thirds up the Nail. Such reeded nails are exceedingly liable to split and become frayed at the free margin, the splitting sometimes extending for a considerable distance towards the lunule (Onychorrhexis). The cause of the Striation is believed to be an accentuation of the parallel papillary ridges of the Nail Matrix, owing to congestion and imperfect circulation."

The different forms of hypertrophy or excessive nail growth play an important part in the practice of Chiropody. Increased thickness of the Nail always means that the space which it takes up in the shoe is occupied to the detriment of the particular toe on which it occurs, or compresses the other toes which thereby may be unduly crowded.

It is necessary here, as in other places, to impress on the practitioner the advantage of giving particular attention to the reduction of nail-bulk. If a strong

nail be allowed to grow too long the effect is equal to a toe longer than that for which the stocking or boot has been provided. Here is another argument in favour of reduction in bulk: a nail in itself may not always be greatly hypertrophied, but heaped-up epithelium under the nail and increased arching of the nail tissue from lateral pressure may have the same effect, and so occupy extra space. In the case of those who do not wear any foot covering at all the nails, like those of the fingers, would be spread widely upon the dorsum. But as time goes on the lateral pressure, owing to the constant wearing of shoes, tends to modify the shape of the nails and to increase their curvature, so reducing the resistance of the supporting nail-bed. It is possible in such cases that the resultant vertical pressure may be so increased as to cause pain in the sulcus.

Severe injury to a nail, by a blow or the intermittent impact of a boot that is too short, or a long down-hill walk in a boot so fashioned that the foot can slip forward to the end, may injure the matrix and thereby considerably widen the nail-fold and the worst form of nail hypertrophy with deformity may result; this is known as "Ram's Horn Nail" (Onychogryphosis). (See Fig. 4.) In some parts of the country, from its frequency among men who attend upon horses, it used to be known as "Ostler's Toe" and is caused by the animals treading upon the man's foot. In this type of overgrowth the nail assumes much the form of a ram's horn, is virtually separated from the nail-bed, and may curve straight

Fig. 1.
NORMAL CURVE

Fig. 2.
ABRUPT CURVE AT BORDER

Fig. 3.
INVOLUTED NAIL (WEAK BED)

Fig. 4.
ONYCHOGRYPHOSIS

Fig. 5.
NAIL CUTTING IN THREE SECTIONS
(see dotted lines)

Fig. 6.
ONYCHOCRYPTOSIS

Fig. 7.
SECRETED SPLINTER DIRECTLY UNDER PLATE

PLATE II.

CERTAIN PECULIARITIES OF THE NAIL

over the end of the toe or even sideways to the detriment of the contiguous digits. In some cases the curvature is the source of great pain as it presses on the surrounding fleshy parts, or may from its mal-alignment set up trouble on the neighbouring toes.

Cases are sometimes met with where there is microbic invasion of the nail structure. The nail and nail-bed may be attacked by Ringworm or Favus (Onychomycosis). In these cases the nail becomes yellow and opaque, or has the characteristic appearance of Asbestos ; it may be of a dirty brownish or black colour and more or less corrugated. There are forms of eczema and psoriasis which may affect the matrix and nail-bed. The folds of the nail may become the seat of pyogenic trouble caused, probably, by pus-inoculation in that region. The condition popularly known as Whitlow is a Paronychia.

Dr. MacLeod, in his "Pathology of the Skin," says that

> "Psoriasis, Eczema, Syphilis and Pityriasis are most frequently associated with Nail affections. The Nails show atrophic changes such as puncta, worm-eaten, white or brown discolourations and ridges and furrows. Deformities of shape supervene and the Nail gets lifted up and possibly loosened from the Nail-bed by an accumulation of horny material beneath its anterior edge. Secondary inoculation of Pus-organisms may occur and a Paronychia be set up. There do not seem to be any definite appearances which are constant enough to warrant the diagnosis of Psoriasis, Eczema or

Syphilis of the Nails without the presence of corroborative lesions elsewhere."

Chiropodists should make themselves familiar with the possibility of such occurrences, but the exact diagnosis and treatment of these constitutional troubles would come within the province of the medical practitioner.

It might be well now to consider what changes in the contour of the nails may be brought about by the habitual use of foot-clothing—a generic name for boots, shoes and hose. (In this connection, for the sake of simplicity, the term " shoes " will include boots.)

A type of shoe might quite possibly be evolved which would not in any way interfere with the structure of the nail. There are specimens made by orthopædic shoemakers which go far towards this ideal. Such a creation would need to be longer than the foot to allow for the possible slipping-forward of the toes in downhill walking, or for the elongation of the foot caused by continual standing or even by the rapid growth of that member. There should be room enough laterally, with sufficient depth in the upper leather. The ideal shoe should also have some provision for the proper aeration of the foot. Condensed perspiration may be a factor in softening nail structure, just as heat and moisture will soften horn, thereby making it plastic. Shoes should be so constructed as to allow the nails to retain their original and normal shape. Should they be too narrow, the lateral pressure may, in course of time, cause the nails to become abnormally curved. In some cases the whole nail-plate

partakes of the curvature; in others, the moulding is produced more particularly at the lateral borders of the nail. (See Plate II., Figs. 2 and 3.) Hose may tend to affect nails injuriously when they are too short, or too pointed and narrow in the median line, or, as is sometimes the case, when two pairs are worn at the same time.

Excessive perspiration or the too constant use of very hot water may often cause relaxation of the sulcus. A saturated condition of the nail-groove causes it to be abnormally sensitive to the pressure of the nail-edge. It is this pathological condition of the groove which often induces patients, in the endeavour to obtain relief, to cut away sections of the nail-border, in order to lessen the pressure. Ill-directed efforts of this nature often set up the condition known as Ingrowing Nail (Onychocryptosis). The sulcus may also be affected by the accumulation of an excessive amount of callous in the groove (Onychophosis), or, it may be, in the enveloping nail-wall at the side of it; for example, on that side of the great toe next to the distal joint of the second toe, which presses the nail-wall hard against the nail-plate. When, in addition to this there is transverse ribbing of the plate (which produces inequality of the edge) the callous may develop freely, even to the production of small corns, which can be very painful. As before mentioned, this condition occurs more frequently upon the outer border, next to the second toe, but it may also take place, owing to the action of the shoe upon the nail-wall, against the

inner border. The reason for this becomes apparent when it is noticed that in most feet the whole of the contact between the first and second toes is just where the distal joint of the second toe presses on the nail-wall of the first which, in turn, envelops the lateral edge of the nail. Suggestions as to dealing with the modification of this concentrated pressure by the use of an interdigital wedge, will be made later in this work.

The condition just described may be a complication of or be conducive to Ingrowing Nail (Onychocryptosis). As this type of affection, in varying degrees, is very constantly met with by the Chiropodist, it will be well to describe it in some detail. As has been previously pointed out it is often the outcome of unskilled efforts to obtain relief from a relaxed and sensitive sulcus. The patient may cut away a sufficient amount of the corner to convey to himself the impression that he has exactly rounded off the edge, but very often it has not been successfully done, and a jagged portion or splinter has been left further back which becomes painful when gradually it is involved in the soft tissues underneath, owing to the Nail's forging forward in its growth. The effect is rather that of a splinter of wood entering the skin, except that the nail splinter is still attached to its parent body and its forward growth brings increased complication. Thus the splinter may become folded and very deeply buried directly under the surface of the nail-edge in such a manner that the term CRYPTOSIS (from the Greek, meaning

a crypt or secret place) is almost a perfect description of this nail affection.

It is quite remarkable what an accumulated concretion of nail spiculæ may form beneath a nail-edge as a result of continued ineffectual efforts to cut away the edge. Even when the chief offending splinter is, apparently, cleared, there is always the possibility, especially in dry skins, that in the depths of the " crypt " area there may be detached fragments so buried that even when relief is obtained from the immediate source of pain, a further search is indicated on subsequent occasions, to be followed by a careful and well-graduated training-up of the nail-edge to its normal form. As a dentist clears the decayed area of a tooth, stops and makes it good for years, so the skilled Chiropodist can clear and make good these defective nails in such a way as to render them serviceable, and so obviate the possibility of the last resource—complete avulsion by a surgeon.

An important detail which must be emphasized in the general care of the nails is that in cutting them they must not be cut too short. The result of doing this is a sinking of the nail-plate below the level of the supporting epidermis at the end of the toes. (See p. 52.) This method of cutting might cause all the discomfort of Ingrowing Nail by the anterior ends becoming embedded at the lower level even though a splinter were not present. On the other hand, too long a nail, especially if of a sturdy character, may increase the length and bulk of the toe, but the illustration shows how one can go to the other extreme.

Mention has been made of corns in the sulcus or in the nail-wall, but attention may here be directed to another form of nail trouble which is known as corn under the nail-plate. This is generally caused by undue pressure upon this part of the toe, and is very often accompanied by a condition of the distal phalanx which might be described as hyper-extension. The distal phalanx of the great toe is contracted in such a manner as to point upwards, the effect of which is to bring the nail into close contact with the toe-cap of the shoe. In some cases it is a cause of considerable pain.

A corn under the nail would be detected, should the nail be fairly transparent, as a putty-coloured spot. On the removal of that part of the nail-plate immediately covering the area, the operator would find a corn embedded in the softer and more fluctuating tissue of the nail-bed, which would yield to the treatment usually employed on other parts of the foot for corns.

While on the subject of abnormal growths existing underneath the nail-plate, it may be pointed out that there is a condition known as Subungual Exostosis. A bony outgrowth may arise from the dorsal area of the distal phalanx, more often of the great toe, and extend to the surface in such a manner as completely to displace the nail-plate in the area of its protrusion. It would have a cherry-like appearance, with probably little or no callous upon its surface. A distinction between this and a corn under the nail is in the colour. The corn shows a putty-like hue, with a concentration of

epidermic cells, and would fluctuate on pressure ; while Subungual Exostosis has little or no surface thickness, shows a characteristic cherry-like redness indicating hyperæmia, and on digital pressure gives the solid resistance which might be expected from an osseous outgrowth. Subungual Exostosis is a condition which can only be dealt with by a surgeon and should the Chiropodist have any doubt about his diagnosis, the case should be referred to a surgeon ; the X-ray would clearly show if it was a bony outgrowth.

Owing to various causes the nail-plate seems sometimes progressively to thicken and this is, generally speaking, more apparent when the individual is elderly, but this thickening may not materially affect the comfort of the patient, except that it may occupy too great a space in the end of the shoe. It is when there is hypertrophy of the nail-tissue with deformity that there is the most trouble, and there is a considerable alteration of form in cases of Onychogryposis, to which reference has already been made.

Having touched upon most of the phases of nail trouble with which it is important that the Chiropodist should be acquainted, it seems desirable now to deal with those conditions most likely to be benefited by chiropodial manipulation.

There is not the slightest doubt that in dealing with even the normal nail skilled cutting is of the utmost importance. In this connection it is worth repeating that a strong nail, if allowed to grow long, is equivalent

to a lengthened toe. It is necessary to allow the free edge of the nail-plate to rest well forward upon the supporting epidermic tissue. It is possible to do this and yet maintain the comparatively square lateral edges of the nail underneath and, by paring and filing, so to contrive that the upper surface of the nail shall be reduced in such a manner as to conform to the contour of the toe, while keeping the lateral edge of the nail intact. In principle, toe-nails need to be cut in the reverse style to finger-nails. That is to say, the centre of the free edge should rather be concave than convex. Where there is predisposition to ingrow, cutting the V-shaped piece out of the centre may possibly be of service. This method is very popular and much in favour especially by those unskilled in Chiropody, though in some cases it is more detrimental than beneficial to the patient. If the nail is of thin consistency this method of reducing the centre may serve to lessen the concentration at the borders, but with a thick nail it is unlikely that this particular form of treatment alone would really relieve the sides, as it is certainly rather apt to cause a greater concentration of pressure near the edge of the nail, which may increase the pain. In the case of a thickened and arched nail there is sometimes much advantage in lessening the bulk along the actual crest of the curve in a longitudinal direction. Then if thinned to exactly the right extent it may allow the nail to expand and thereby lessen the downward thrust into the sulcus. But it is essential that the actual thinning

of the nail, which can be done by paring, filing, or scraping with glass, should not be carried so far as to admit of the soft tissues underneath being exposed. Some nails take rather an abrupt curve near the lateral edge (Plate II., Fig. 2), which creates a type of protuberance at one or both sides instead of in the centre as has already been mentioned above. Because of this there is sometimes a great deal of tenderness evident in the sulcus owing to the direct downward pressure of the lateral margin. Therefore, reduction of the nail-bulk by paring, etc., must be mostly directed to the borders of the nail. The nipping away of a V-shape in such a case would obviously increase rather than decrease the difficulty. To achieve a good result the nail must be whittled down, especially at the lateral borders where the shoulder is apparent, to give the superficial appearance of a rounded nail; the under-edges should remain virtually square.

In cases of Onychogryphosis (the term Onychogryposis is given in many text-books, and the writer believes this form to be the more correct), the chief object is to reduce the bulk satisfactorily while interfering as little as possible with the surrounding soft tissues. Where a nail-drill is installed the work of reduction can be carried on with that instrument. Failing this the operation can be best performed with a good pair of nippers. While steadying the toe and nail with the left fingers and thumb, the nippers should be used in the right hand, gripping and clearing small sections of the nail where any small prominences give opportunity. It is

essential, when using the nippers, to grip the Nail so truly and with such balance as not to drag upon its attachment to the toe; otherwise, pain is caused to the patient. The nippers should be closed with a maintained steady pressure, not with an abrupt jerk. The difference should be that between pressing and pulling the trigger of a gun. This nipper-work may be varied by paring with an appropriate scalpel that has a rounded rather than the usual pointed end, and should have quite a strong blade, which should not be deep. The final process, to attain a smooth surface, would be best accomplished by filing. The operator should be reminded of the necessity of wearing a rubber thumb-protector on the right hand while paring, as the right thumb must necessarily be used to steady the body of the nail during the operation and the covering prevents the scalpel from cutting into the flesh.

In regard to the removal of epithelial undergrowth it is generally desirable to do this after reducing the bulk of the nail, as clearing the sulci and other cavities underneath may make the tissue a little more sensitive for working, although, of course, circumstances might make it desirable to do the clearing first of all.

It should not be forgotten, while reducing the nail-bulk, that in some cases there may be in the centre of the hypertrophied bulk a tuft of vascular tissue which must not be injured. This is not present in every case, but it should always be looked for; but in case of injury the abraded portion can generally be sealed with the Nitrate of Silver stick. It is always worth while to

prepare the surrounding callous for clearance by softening with Liquor Potassæ five to ten minutes before the clearing is begun. Hypertrophied nail can be softened in a similar manner. In such cases the Potassium Hydroxide (of which Liquor Potassæ is about a five per cent. solution) should be used in at least a twenty-five per cent. strength, the nail being kept in a saturated condition for an hour or more before the operation; or the nail could be saturated with soft soap applied freely overnight and covered with wool and gutta percha tissue. Wool saturated with a strong solution of Calcium Sulphide can also be of service as a softener when used in the same manner, but its odour is by most people considered objectionable. A plaster of Salicylic Acid (about 25 %) can be adhered a few days previously and makes a good nail softener.

After the nail has been satisfactorily reduced, the whole area should be painted with an antiseptic (Tinct. Iodi Mitis would be appropriate), and if it should seem desirable, a protecting toe-stall of antiseptic gauze, stockinette material or chamois leather might be worn for a few days. If the toe is painted with Iodine tincture, mercuric gauze should *not* be used, as the combination might act as an irritant.

It should be borne in mind that a nail, whether thickened in the manner of which mention has just been made or by transverse ribbing, is liable to create a cornification of the sulcus or nail-wall (Onychophosis.) As an aid to exfoliation of these grooves the same

chemical agents may be utilized as for thickening of the epithelium, but, in a general way, clearing out the nail-groove with Peroxide of Hydrogen as a preliminary followed by the application of Liquor Potassæ, which should be allowed to remain for about five minutes before operating, is an effective method of loosening the callous, and rendering the groove-corns amenable to removal. The toe should be held from underneath with the left fingers and thumb in such a way as to pull out the nail-walls and expose the minute concentrations in the wall or groove, and the usual process of enucleation followed. It should be mentioned that only small instruments with limited cutting surface should be used.

Sometimes toes other than the great toe are subject to calloused sulcus, possibly with further development of nail-groove corns. The toe most commonly subject to this disorder is the fourth, when the external border is generally affected, although it may also occur on the fifth or any of the other small toes. This was described by Durlacher as a "Concealed Corn." Its development in the tissues below the nail-edge makes the description apt. Flexion of the toes in the act of walking, causing abnormal pressure on the nail-edge, is the pre-disposing cause of this trouble. The usual Sulcus operation in such cases should be supplemented by the adoption of sufficiently long shoes and hose and, to effect a straightening of the toe and to alter the pressure, a felt prop should be fitted to the plantar aspect of the proximal, medial, and part of the distal phalanges. It

might here be pointed out that crowding together of the distal extremities of the toes, and the consequent increased lateral pressure, is usually complicated by the spreading of the bones of the foot in the metatarsal region. This can be greatly modified by the judicious use of 1½ inch strap about 16 inches long being brought round the shafts of the metatarsal bones, so as to reinforce the weakened ligaments of that region and thus improve the alignment. A thin adhesive felt interdigital separator, which just relieves the pressure of the nail-edge from its contiguous toe, is of great value in certain cases. Particular care, however, should be taken in relieving this defect that the alignment of that toe is not altered to the detriment of other parts.

If from the use of the Liquor Potassæ the nail-working should be rather slippery, enucleation can be aided by the addition of a little Friars Balsam, which gives the necessary "tackiness" to the tissues. An after-dressing of a 25 per cent. solution of Nitrate of Silver is often found desirable, especially when the skin is moist; it is not so useful in the case of a dry skin. The groove should be packed either with sterile gauze, felt, Amadou or chamois leather plaster, to make a cushion between nail-edge and sulcus. In cases where the nail-wall is pressed upon by the distal joint of the second toe, the inter-digital wedge is very important, as by its use the lateral pressure on that part is minimised by being transferred to parts nearer the proximal space of the great and second toes. (See p. 118, figs. 6, 7, 8.)

Where corn under the nail has been diagnosed, the method of approaching the seat of the trouble by clearing the superficial nail-plate must be decided upon. Should the corn be sufficiently near the end of the toe to permit of the process, portions of the nail can be removed from the free edge by using nippers, making V-shaped incisions until the nail is cleared to such an extent as to leave a slight margin around the corn. Should the corn be nearer the matrix than would permit of this method, it would be necessary to work down the centre of the portion of the nail which covers the growth either with the drill or by paring until the corneous structure is exposed. Removal of the corn is not very difficult and an appropriate after-dressing is the 25 per cent. Nitrate of Silver solution. A graduated plantar pad, placed under the proximal phalanx, acts as a corrective should the distal phalanx have become so hyper-extended that the shoe presses unduly upon the toe nail. It is usually desirable to plaster over the cavity from which the corn has been taken, and this generally means covering the greater part of the nail for the time being.

Onychocryptosis is almost invariably the manifestation of a serrated nail or splintered edge, growing down and pressing into the sulcus. It has already been pointed out that the nail splinter is still attached to the main body of the nail,* so that its situation can be located by careful exploration with an excavator. Ordinarily this instrument can be passed underneath the nail from

* Plate II., Figs. 6, 7.

the free edge to the matrix, and then back again from the matrix without meeting with any resistance, but where there is a splinter the instrument necessarily comes into direct contact with the obstruction. Whether the Chiropodist prefers to work with the groove as dry as possible or whether he finds, as some do, that it facilitates working to have it saturated, the usual preliminaries of spraying the groove with an antiseptic and clearing it out as far as possible, must not be omitted, after which some operators prefer to work with such a medium as Liquid Iodex or Crooke's Collosol Iodine Oil, in the groove.

The two most practical methods of operating to remove the splinter are :—To cut a graduated section of the nail with an appropriate scalpel or cleaver, beginning on its proximal edge, i.e., that which is nearer the matrix, and working upwards towards the free edge, thus separating the section of nail to which the splinter is attached from its base forward, and then lifting it out. The second method is to begin at the free edge and to work from it towards the matrix, in a graduated section which should become narrower as it is being carried down to the proximal side of the splinter-attachment. This should be begun with the nippers and finished with cleaver, chisel, or gouge.

Splinters usually occur in the anterior two-thirds of the nail, and it is desirable as far as is consistently possible that the division of the splinter-bearing sections should be confined to that particular region. Owing to the œdematous condition of the surrounding soft parts

it is occasionally difficult to achieve perfect separation of the nail-sliver and attached splinter at the first operation although, as a rule, this should be accomplished if possible. It has been found sometimes, however, that if the section can be completely severed it may be left for twenty-four hours before extraction, any inflammation and swelling being allayed meanwhile by the use of a compress, such as Burow's Solution, half dilute, and the work can be finished the following day. If the separation is entire it is not unusual for the separated portion to work out during the night, thus simplifying the operation and saving unnecessary pain in the process of removal.

When a splintered portion of a nail is so sharp as to pierce the dermic surface, there sometimes results in Nature's efforts at repair a protuberance of granular tissue through the orifice of the wound which, ordinarily, would have bridged over and healed the lesion. As, however, the small splinter continually reopens the fissure, the granular tissue exudes and forms an hypertrophied mass which may cover a considerable surface at the side of the nail. This gives that part of the toe the appearance of a mass of raw tissue, which is very liable to bleed and in some cases may show a tendency towards ulceration. It is essential that this exuberant granulation should be destroyed either before or after removing the splintered portion of nail. In the majority of cases, however, this must be done before removal, as the seat of the trouble is obscured by the mass of granulation.

In some cases it may be considered desirable that the bulk of the redundant mass should be snipped off, a caustic or a powerful styptic being applied to the remaining portion. This should be preceded by thorough aseptic preparation and by the application of a ligature, such as a few turns of a rubber band, at the base of the toe to control any possible hæmorrhage. This method is merely mentioned as being one that is sometimes followed, but it is not necessarily advised because, usually, a satisfactory result can be obtained without practising it. Moreover, it has the disadvantage of being rather alarming to the patient and carries with it greater risks.

Quite a satisfactory result can be attained by the use of an escharotic, such as Sulphate of Copper, the Silver Nitrate stick, Nitric Acid, or powdered Alum. Sulphate of Copper should be rubbed in and around the affected spot daily so as to penetrate every part of the mass. This treatment should be persisted in until the mass is destroyed. The fused stick of Nitrate of Silver should be used in the same way, but with possibly two or three days' interval between the applications, and it is probably the most effective remedy for the purpose as it can so easily be restricted to the affected part. One application might even be sufficient to clear away as much as will allow the operator to find and remove the splinter. This treatment, if necessary, can be continued at intervals of about three days, according to the severity of the case, until the part again becomes normal. Preference is sometimes given to a twenty-five per cent. solution of

Nitrate of Silver painted well into and over the growth. Nitric Acid is effective, but is more violent in its action and is not so easily controlled as to area. The visible fumes of the acid are sometimes a little disturbing to the patient.

In bad cases it is advisable to follow the application of the escharotic with a wet dressing of Burow's Solution, but in some it is sufficient merely to wrap the toe in sterile gauze. Patients should be seen again after the lapse of one, two or three days, according to the severity of the case.

Another method of treatment is by Ferric Perchloride, touching the spot with the strong solution (Ferri Perchlor. Fort.), but strictly limiting the application to the actual area ; or by the unrestricted painting of the whole area with the Ferri Perchlor. Fort. diluted with two parts of distilled water. This, of course, has also strong styptic properties. Where there is evidence of ulceration, Sub-Nitrate of Lead in pulverised form applied daily is a very effective agent. The constant daily use of powdered Alum is often considered desirable as a constringent, and it will sometimes slowly effect the purpose for which the more active agents already mentioned have been used. Exsiccated Alum, the stronger form, is occasionally used, but not at such short intervals, as it is more escharotic in its effect.

As it is obvious that the nail-splinter is the cause of all the trouble, it should be dealt with at the earliest possible moment. After effective clearance return to

the normal is usually rapid, but, for a few days, it may be desirable to use a loose packing of gauze having first dressed the part with such an antiseptic as Balsam of Peru, Subitine, or perhaps dry Thymol Iodide powder. When the groove appears to be quite healthy a firmer packing of sterile Amadou, felt, or leather plaster might be employed. Some operators, when packing with felt under the nail, impregnate it with Acetone Collodion, or a combination of Acetone Collodion and Bismuth Carbonate ; this forms a dressing which lasts for some time and is not affected by the daily bath. It is obvious that these harder packings must not be used until there is perfect granulation, otherwise there might be a recurrence of pain.

The after-treatment consists in seeing the case periodically and gradually training up the nail by filing the edge and keeping it packed until it is quite restored to the normal shape, with a perfectly straight edge.

It now seems appropriate to offer some general suggestions on care of the nails and, although reference to some of the subjects has already been made, it may not be out of place to lay still further emphasis upon them, and supplement what has already gone before. Whether the nails themselves are in a pathological condition, or their length and thickness may be creating additional pressure elsewhere, it is imperative that the art and science of nail reduction should be studied and acquired by the Chiropodist.

There are many cases where contraction of the distal or proximal joints of the toe is a direct result of excessive length or bulk of its ungual appendage. At the same time, in reducing the nail-bulk and length it has always to be borne in mind what will happen when the nail grows up. Proper reduction and smoothing which seem so appropriately neat may in the course of some weeks present an entirely different appearance. There arises the question: Will the case be seen again in time to obviate such consequences as the reduced free edge catching in the hose, or breaking off as the nail forges forward? If the Chiropodist has the opportunity of seeing the nails at stated periods, all may be well. If, on the other hand, he has not the opportunity, then instructions should be given to the patient to file, from time to time, the nail-plate at its end and dorsal surface, so that the advantage gained by the professional process of reduction may be maintained.

As a general principle the preservation of a square-cut nail is the best, but, as has been mentioned earlier in this work, in some cases it is advisable to make a concave centre, virtually reversing the usual shape of the finger-Nail. But there are exceptions to this good rule. The shape of the toe has to be taken into consideration, and, occasionally, where there is virtually no nail-wall, it may be admissible or desirable to form a more rounded edge, providing this can be done consistently without serration. Sometimes this is particularly desirable in dealing with the nails of the smaller toes, especially with

those of the third and fourth, where there is the possibility of the lateral edges protruding into the side of the next toe. It might be worth mentioning that it is not at all unusual for patients, especially those who with increasing age find difficulty in attending to their own nails, greatly to appreciate careful professional manipulation, and Chiropodists have often found persons, who have originally consulted them for something quite different, continue their visits almost solely for the purpose of receiving skilled nail-cutting.

In the nails of some people may be found small elongated tufts immediately under the centre free edge of the nail-plate which are or have been adherent to it, and have been drawn forward beyond the usual margin of the supporting tissue. In such cases it is sometimes advantageous, if the tuft is still adherent, to use an excavator or cleaver, interposing it and working between the tuft and the nail-plate so as gently to loosen the former. By this means it will be easier to cut the nail separately with the nippers. It is quite possible that if the operator is not on the look-out he may, in the process of cutting, include the small tuft in the nippers and thus cause abrasion and probably pain. If, however, he bears in mind the possibility of the presence of these tufts, risk is avoided by cutting the nail in three sections, instead of nipping straight across the nail-edge. (See Plate II., Fig. 5.) Incidentally, this method prevents the bending of a curved Nail during the process of cutting and thus in two ways it ensures painlessness.

Some patients suffer a good deal of inconvenience from the adherence to the nail-plate, at its proximal area, of the eponychium which, being thus attached, is drawn forward with the nail in its growth. This causes stretching and increased sensitiveness of the dorsal aspect of the posterior nail-wall. In cases of this kind it is sometimes an advantage carefully to cut transversely a straight section through the surplus adherent callous before separating it from the dorsum of the nail. Then the vascular tissue can be gently pressed back with some appropriate wooden implement, e.g., an orange-stick, after which the adherent cuticle can be scraped away. The Collosol Iodine Oil is a useful vehicle for working and for after-dressing.

In nail trouble the operator is almost sure to suggest shortness or narrowness of the shoe as something to be guarded against. But it should also be pointed out that the sock or stocking may be at fault owing to its being too short or badly fitting. Those who are in the habit of wearing two pairs of socks are often inconvenienced owing to the over-sock generally dragging upon the one underneath in such a manner as to make it pull upon the toes. In treating cases where excessive toe-crowding is the source of nail-trouble, it is an advantage to cause a spreading of the toes by means of a carefully adjusted strap around the shafts of the metatarsal bones, using 1½ inch Zinc Oxide strapping or calico adhesive strapping. This should exert a reinforcing effect upon the lateral ligaments which would correct the inevitable widening

of that part which occurs when the toes are crowded together. The author has often found that this strap has been of supplementary assistance to the separating action of the inter-digital wedge and has so facilitated the remedial treatment to the sides of the Nails.

Either Crooke's Collosol Iodine Oil or Liquid Iodex may be used very generally in dealing with nails, particularly in clearing the grooves, the loosening of the adherent soft tissues, and separation of the central tuft from underneath the nail-plate. A good astringent for strengthening the nail-area is Lano-Cyllin Ointment, with which is incorporated Oleate of Tin, in the proportion of one part Oleate to two parts of Ointment. When constantly used for a long period this compound has in some cases been found to bring about a distinct improvement in the nail-substance.

The Chiropodist is often called upon to treat cases of Onychogryposis in bedridden and aged patients. Sir John Bland Sutton considers what he terms "nail horns" as common to bedridden women and the present writer's experience certainly confirms this. In such cases it is often desirable, whenever possible, to prepare the nails the night before with the soft soap process before mentioned. One of the factors contributing to this condition in patients confined more or less permanently to their beds is the weight of the bedclothes pressing on the ends of the toes when the patients habitually recline upon their backs. To guard against this it is sometimes desirable to recommend the use of

a protective cage or even of a bolster underneath the clothes at the foot of the bed.

In cases of Onychomycosis it may come within the province of the Chiropodist, with the consent of the patient's medical adviser, to clear away the fungoid nail-tissue, to the characteristics of which reference has already been made. In such circumstances it is advisable to aim at complete extirpation of all the affected tissue, so that no particle of diseased nail may be left. Needless to say, this requires very careful operating, possibly spread over a series of visits. If more than one visit is necessary, the remaining parts should be prepared for the subsequent visit either by painting twice daily with a five per cent. solution of Salicylic Acid in surgical spirit, or by applying a ten per cent. Salicylic Acid ointment, under an adhesive or using a fifteen per cent. Salicylic plaster. The possibility of a healthy development of nail in these cases is greatly dependent upon the complete removal of the diseased cells. Some specialists recommend the following formula as an application :— ℞. Sulph. Præcip ℥ij. ; Acid Salicyl. grs. xxx ; Saponis Viridis ad ℥j ; Misce.

In his " Pathology of the Skin," Dr. Macleod mentions the condition known as " reeded " nail, Onychorrhexis. The Chiropodist, when such a case is brought before him, may be called upon to level, or cut away, with a view of preventing obtruding fragments of the nail from catching in the foot-covering, and causing pain. One of the best methods of prevention is to use a piece

of pliable Zinc Oxide Strapping cut to the shape of the nail and securely adhered to it. This will probably remain *in situ* for a considerable time and grow up with the nail.

It is a popular belief that to allow the nail to grow longer than usual provides protection to a corn which may have formed on the apex of the toe. After very thoroughly testing this theory, the writer has found, in the majority of cases, that it is far less satisfactory than removing as much as possible of the nail and protecting the part by other means, such as an appropriate plaster or felt.

A few suggestions as to instruments may help. Two types of NIPPERS are essential for good working: — one should have a convex face. This is good for all-round purposes and for nipping the lateral sliver in Ingrowing nail, as well as for a reduction of Onychogryposis (Ram's Horn Nail). The other might be a concave pattern, but not deeply so. The special design shown on page 154 has been devised by the author for the purpose of cutting away the graduated section or the lateral border, in such a way that there is no possibility of the points injuring the soft tissues.

The EXCAVATOR should be used in exploring the nail-groove for splinters, or for the minute corns which sometimes form in this region. This instrument is very similar, except as to length of handle, to one of the excavators used by dentists.

The PARING-SCALPEL for hypertrophied nail-tissue has already been mentioned, when it was suggested that it should be without a point and not too deep in the blade. With a rubber thumb-stall this serves for paring the great toe-nail. A second and smaller scalpel, with a strong blade, but not deeper than one-eighth of an inch, sometimes useful in working on the smaller toe-nails. Those Chiropodists who work from the matrix to the free edge use one of this dimension. There is a tremendous advantage in having these knives furnished with hollow metal handles, because the grip is better, they are less heavy in working, and are not so likely to slip from the hand.

Of course some form of CHISEL and GOUGE is needed for nail-working, especially when operating from free edge to matrix. The chisel is used to follow up and complete the separation of the section from the nail-plate. There are cases in which the gouge can be used for this work; and this is especially useful for scraping the nail-edge, as it gets well underneath and ensures there being no serration of the lateral borders.

NAIL CLEAVER. Above is an instrument which has been invented by the author and which has a two-way cutting edge, and it is so curved as to enable the operator to witness the progress of his working while severing the

section. The blunt apex is an advantage in making it possible to press away the soft tissues while working on the nail-edge.

There are a number of steel FILES now on the market which are very appropriate for smoothing purposes, and although the usual flat pattern is useful for a good deal of the work, there is a gouge-shaped file which is well adapted for edge-levelling.

Lastly, it is most desirable to have a pair of strong, curved SPRING-FORCEPS, which are very useful in lifting out nail spiculæ.

Before leaving this subject, it is desirable to remind operators how essential it is that all instruments should be maintained in a state of mechanical and surgical cleanliness. The safest method of securing this is by boiling for at least ten minutes in water to which has been added a small quantity of Bicarbonate of Soda. There is a quicker method. After thoroughly cleaning instruments mechanically, they should be immersed in pure Lysol or pure Carbolic Acid for five minutes. They should then be lifted out with a pair of forceps, thoroughly rinsed in Methylated Spirit and left, until required, in the spirit. In the case of files a small steel brush* facilitates mechanical cleansing.

The following chemicals are particularly applicable to nail-treatment.

Solution of CARBOLIC ACID (one in forty), sprayed in

* Such as ladies use in cleaning suede shoes.

the nail-groove, or used to saturate cotton-wool which should be applied for ten minutes previous to working, has an anæsthetic as well as antiseptic action.

The CHLORIDE OF ETHYL Spray produces freezing and consequent insensibility of the part. At the same time, it induces congelation of the soft tissues to such an extent that it is difficult in working to distinguish one part from another, and when thawing ensues and the blood returns to the part, there is often a certain amount of pain. Therefore, this process is not much in favour.

The preparation known as DENTALONE (Parke, Davis & Co.) which contains Chloretone combined with the oils of Cloves, Cassia, and Wintergreen, is sometimes useful in lessening sensibility of the vascular parts when applied in the same manner as the Carbolic acid solution.

Probably the best all round antiseptic in surgery is a solution of IODINE in Spirit. The weak tincture can be used in most aspects of Chiropody, and the slight discolouration of the skin is usually insufficient to obscure the objects which are being worked upon. Two most important forms of Colloidal Iodine for nail working are the liquid Iodex and Crooke's Collosol Iodine Oil. After cleaning the nail-groove with Hydrogen Peroxide the colloidal oil is an appropriate vehicle with which to saturate and in which to work.

LIQUOR POTASSÆ, which is so excellent in exfoliation of the thickened nail-groove, is also antiseptic in its action, as is also NITRATE OF SILVER in its different forms.

Where an antiseptic nail-groove powder is needed, that preparation of THYMOL IODIDE known as ARISTOL makes a desirable after-dressing. In cases where an antiseptic compress is indicated there are few to equal ALUMINIUM ACETATE SOLUTION, which is known also as BUROW'S SOLUTION. It has been found that the formula given in Squire's "Companion to the British Pharmacopœia," is most effective when diluted with equal parts of distilled water. HYDROGEN PEROXIDE is a most effective antiseptic, but its action is strictly limited to the period of ebullition, after which it becomes inert. LYSOL is a saponaceous product of the destructive distillation of coal. As a disinfectant and antiseptic for the operator's hands and instruments it is of great value. It should be used as a one per cent. to two per cent. solution in water.

The use of TANNIN as a nail-groove hardener is to be recommended, particularly in cases of sensitive sulcus, to whatever cause this may be due. Should the skin be broken, it makes an excellent coating by its action of combining with the albumen. The powder can be placed in the grooves once or twice daily.

Chapter V

JOINT AFFECTIONS

Many forms of joint affections are outside the province of the Chiropodist; but his services, although they may be limited, can be of the greatest possible benefit to patients in a large number of cases. In the following pages I shall endeavour to indicate something at least of the exact range of the possibilities of usefulness which are open to the practitioner in this direction.

In the feet, affections of joints are produced particularly by perverted function, but at the same time it should be borne in mind that in some instances they can be traced to constitutional disorders. There is no doubt that atmospheric conditions are productive of pain, especially where there is humidity. The feet are perhaps more subject to the effects of extremes of temperature than other parts of the body, and one can hardly be surprised that the effects of chill may be evident when a bath is taken at, say, 98° or 100° F. and within a few hours the same feet, thinly clothed, come in contact with a pavement or roadway at a temperature approaching freezing point. It is not to be wondered at, therefore, that Chiropodists notice a greater frequency of joint affections resulting from chill during the winter months. There is no doubt that at high altitudes joint troubles are less,

indeed that is the case with most affections of the feet, whereas on lower levels, especially near a river or on clay soil, they are much more prevalent.

It is well known that those joints which are the most prominent are the most likely to be affected by pressure of the boot and are usually those parts upon which Corns are liable to form. The first metatarso-phalangeal joint, generally known as the great toe joint, is that most likely to be the seat of trouble. Outward deviation of the great toe constitutes the condition designated Hallux Valgus, when the ligaments on the inner side of the foot in relation to the mid-line of the body become stretched, while those on the outer side become contracted, the other tissues accommodating themselves to the change. Among the predisposing causes of this trouble are short boots or stockings, especially when the foot is growing, or in the median-pointed shoes which are so commonly worn. Abduction of the great toe, stretching the ligaments and exposing the head of the first metatarsal bone to more than usual wear and tear, generally conduces towards enlargement of that member. Some pathologists consider that an osseous enlargement at the base of the first metatarsal bone is sometimes responsible for its becoming displaced inwardly, with consequent eversion of the great toe, but it is generally accepted that the first-mentioned causes are the most common. There is sometimes an outward displacement of the head of the fifth metatarsal bone accompanied by a sharp turning-in of the little toe and exposure and

consequent enlargement of the head of this metatarsal bone. So that both sides of the foot may be considered liable to the formation of a bunion. In both these cases there is lateral spreading of the metatarsal region, while the phalangeal region is correspondingly contracted. In some cases these joints may be simply enlarged without pain being experienced ; or the condition may continue through varying degrees towards acute Arthritis which, as its name implies, is an inflammatory disease of the joints, involving all the structures and often accompanied by changes in the synovial and peri-articular membranes.

Where there is a good deal of wear and tear of a joint it is usual for an Adventitious Bursa to develop on the inner side of the metatarsal head where the ligaments are stretched and the part is most exposed. This bursa in the ordinary way acts as an appropriate buffer and a protection to the part, but is often adversely affected when any degree of inflammation is set up. In severe cases surgeons recommend operation for correction of joint deflection, which may consist of removal of the bony prominence, or perhaps a part or whole of the head of the metatarsal bone, and probably such measures as will bring the phalanx to its normal alignment. But there are many cases when this may not be considered advisable, or it may be that the patient is averse to such an operation, and here it is that the Chiropodist has it in his power to give the patient considerable, if not complete, relief from pain by means of judicious padding. The mal-alignment itself, if the case is brought to the

Chiropodist in the early stage, can be considerably modified by persistent treatment.

It is in the growing stage, particularly, that tendency towards Hallux Valgus seems to begin. At the present time, although more attention is given to children's foot-wear and to the needs of their feet, it is quite possible that the Chiropodist may meet with cases of slight deviation of the great toe in which there is no pain and which possibly may pass unnoticed. This deviation perhaps may have been induced by shoes and hose which originally were of the proper length, but owing to rapid bodily growth or shrinkage of the hose, have become too short, so that the yielding character of the foot, accommodating itself to this condition, lends itself readily to eversion of the great toe. In this connection it is well to remember that bodily growth is generally preceded by lengthening of the foot, which is sometimes more rapid at certain stages than at others. The treatment which should be adopted in such cases would be the regular use of the interdigital wedge. This is a wedge-shaped piece of felt, the broad base of which laterally should be from a quarter to half an inch, according to the degree of deflexion, which should be placed as low down as possible towards the webbing between the first and second toes, the apex reaching just up to the phalangeal joint. (See Plate III, Fig. 4.) Although this pad tends to influence the return of the great toe towards the middle line of the body it is from the fact of its being placed well down to the base of the

toes, and reaching anteriorly only to the first phalangeal joint, that it does not force the second toe or other smaller toes in any way out of their position. The interdigital wedge should have a small adhesive surface on one side to prevent it slipping out when the foot-gear is changed, or when the patient is in bed. As a protection from traumata a crescent-shaped pad placed on the proximal aspect and close up to the joint should prove effective. This pad should be included under strapping plaster which should be wound around the shafts of the metatarsal bones. The strapping should be carefully drawn round obliquely, forming a figure of eight so far as is possible, always having regard to the contour of the foot. This is better than placing it straight round because the edge of the plaster is less likely to impinge upon the soft tissues. The parent or nurse of the young patient should be warned that the inner sides of the shoes should be as straight as possible and that the shoes themselves should be at least $\frac{3}{4}$ to 1 inch longer than the toes. It is not necessary for the shoe to be too wide proximal to the metatarso-phalangeal region, as "sloppy" shoes are apt to cause the wearer instinctively to keep the toes always in flexion in order that the shoes may be prevented from slipping about, but there should be sufficient upper leather to allow free movement of the toes. The benefit derived from a properly shaped sole would be considerably modified if there were not enough vertical space for this free movement. In some shoes the toe-caps, instead of being properly blocked, are so constructed that the

leather comes over the ends of the toes like the borders of a tent, and freedom in walking is only attained when the sole has become bent upwards until it assumes the shape of a rocker. At the present time, fortunately, there are not so many children's shoes that have this character.

TENT-LIKE UPPERS.

PROPERLY BLOCKED END.

There is a useful exercise, which can be practised by patients themselves, where there is no inflammation, but only a valgus tendency of the great toe. This consists in grasping the metatarsals with one hand while the great toe is held with the other and carefully rotated for twenty or thirty times once or twice daily. This should have the effect of loosening any adhesions and of stretching any contracted muscles which might tend to keep the toe everted. This exercise is of distinct advantage.

It must be borne in mind that although there may be a tendency towards Hallux Valgus, if it is possible to enable the great toe to function in a position of restored alignment constantly and without a break for some months—say, for twelve months or even for two years—it is quite within the bounds of possibility that a vastly

improved condition may be secured, which could be maintained by the patient himself were he to follow the suggestions contained in the foregoing pages respecting the straight-sided shoe, the rotary exercises, and the inter-digital wedge.

> "Nature never wastes her time and material in maintaining a muscle at its original length when the distance between the points of origin and insertion is for any considerable time without interruption shortened."

This quotation is supplementary to what is known as Davis's Law and that is as follows:—

> "Ligaments, or any soft tissues, when put even under moderate degree of tension, if that is unremitting, will elongate by the addition of new material; on the contrary, when ligaments or any other soft tissues remain uninterrupted in a loose or lax state they will gradually shorten as the effete material is removed, until they come to maintain the same relation to the bony structures."

These facts apply not only to the cause of the trouble, but with equal force to the suggested corrective measures which will now be described in detail. In this connection the crescent-shaped pad should be placed upon the proximal aspect of the head of the first metatarsal bone, after which a flask-shaped piece of plaster made of felt ($\frac{1}{32}$nd inch) or, preferably, chamois leather, should be

cut and the neck-end made to adhere to the great toe, and strapped obliquely. This should be done very carefully to avoid constriction of any portion of the nail-wall, and to ensure that the edges should not cut the webbing at the base of the toes. The plaster having been made fast, the remaining portion should be well pulled down towards the heel and stretched over the joint and its crescent-shaped pad, the lateral borders being carried well round towards the middle of the foot. This should bring the toe nearly into straight alignment. The met-strap should then be carefully fastened round the foot so as to include the flask-shaped cover and to give lateral support to the metatarsals, thus maintaining this position of the toe. This makes all secure and keeps the flask-shaped plaster in a state of limited tension upon the great toe. Should the flask-shaped plaster seem insufficient to retain the toe in its corrected position it may be advisable to strengthen its pull with a longitudinal strap carried laterally round the end of the toe and brought down to a spot a little farther back than the crescent-shaped pad, before the metatarsal strap is applied over all. This position of the toe should be assisted of course by the inter-digital wedge. (See Plate III.)

It is perhaps superfluous to add that all this should be done with very great care, and the practitioner should take heed that the pull upon the toe by the reinforcing strap is not greater than can be comfortably borne by the patient, and should in no way drag upon the nail-structure.

Fig.1 FLASK SHAPED COVER

Fig. 2. CRESCENT PAD IN POSITION

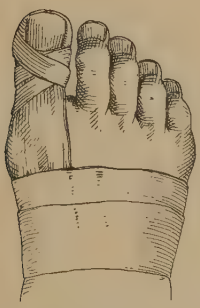


Fig.3. COVER STRETCHED ON

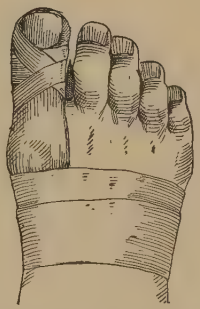


Fig.4. INTERDIGITAL WEDGE IN POSITION

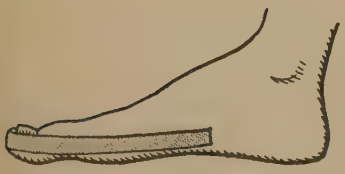


Fig.5. (MEDIAL ASPECT) REINFORCING STRAP

Fig.6. (FROM ABOVE)

PLATE III.

STRAPPING FOR HALLUX VALGUS

If the joint is very tender on account of corns or from other causes it may be inadvisable to apply the reinforcing strap; but in some other cases it may be of advantage to carry it right round the heel and forward on the outside until the end is under the metatarsal strap. If properly carried out the patient will experience a great sense of comfort from this method of covering.

In certain stages of this trouble it is not unusual to find some amount of congestion or inflammation in the tissues of the joint, in which case the application of Iodine in one of its appropriate forms is clearly indicated. This can be done before the plastering, and, for one application only, it might be advisable to use the strong tincture. In cases where plaster is not essential an excellent form of Iodine is that which incorporates it in an unguent, such as Iodex, and this should be worked into the joint by inunction, the treatment being repeated by the patient once or twice daily. Independently of the effect of the Iodine the increased circulation promoted by the rubbing is beneficial. This colloidal Iodine can be used continuously for a considerable period. It does not dry up or blister the surface of the skin as might be the effect were the tincture constantly used. A few patients find the black colour of the Iodine an objection (although if too great a quantity is not used the colour quickly disappears); in that case Crooke's Collosol Iodine Oil might be employed. There is a smaller percentage of Iodine in this preparation, but it is very useful in penetrating the skin and is more cleanly.

There is an inexpensive electrical device known as the Thermolite Lamp the rays of which, when brought to bear upon a joint smeared with Iodex, promote more thorough penetration and induce beneficial hyperæmia. Another satisfactory method of increasing the flow of blood to the joint-tissue is by the use of the electric vibrator which also can be utilized at the time of applying the Iodine Oil or Unguent.

With very severe inflammation of the joint it is obvious that rest is most essential to successful treatment, and it may be necessary in extreme cases to refer the patient to his medical attendant, who would probably enjoin complete rest as a necessity. But many stages short of this, in instances where the patient may be compelled to be moving about, the Chiropodist's aid may be invoked to contrive such protection as may be possible while the patient continues his daily round. This can sometimes be managed by cutting the shoe or inducing the patient to wear a gout-shoe, and padding the foot so that the affected part may be immobilised so far as is possible consistent with use, the strain upon the joint being taken by the pad.

One of the most serviceable palliative applications is composed of Kaolin (China Clay), impregnated with a combination of such ingredients as Boric Acid, Thymol, Methyl-Salicylate, Oil of Peppermint and Glycerine. A trade preparation of this kind which is of a superior consistency is known as "Antiphlogistine." This is very efficient in deep-seated inflammation and even where

there may be Periostitis or Synovitis. By its action congestion of the affected part is decreased and osmotic interchange promoted. It can be applied over the whole area of the joint at night-time and, if a gout-shoe is worn, it might remain in contact throughout the day as well. If the ordinary shoe has a section cut out over the joint, the opening can with advantage be covered by what is known as an " invisible " patch. This is merely a piece of soft loose leather adhered over the orifice to shield the part and lessen the possibility of exposure to damp and atmospheric changes. When this cataplasm has reduced the acuteness of the inflammation, it may be desirable to follow it with a compress of the Aluminium Acetate solution known as " Burow's Solution," which has been found to act most efficiently when diluted to half-strength with distilled or boiled water. In addition to its properties of allaying inflammation this solution appears to have a stimulating and antiseptic effect on the tissues, and its application can be continued with advantage until the inflammation has entirely subsided.

A severe form of inflammation of the joint is often accompanied by hyper-secretion of the contents of the adventitious bursa or even the synovial membrane. This state can of course be recognised by the swelling of the area and the fluctuation of the tissues, which indicate the presence of fluid underneath. In many cases the use of antiphlogistics will promote absorption, the bursæ returning to their normal dimensions. On the other hand, these remedies may not prove entirely efficacious and

general disturbance of the joint may be followed by chronic Bursitis, the congested lining of the sac causing a continuous abnormal secretion of the fluid. Occasionally during removal of a corn, enucleation of the apex may open up a bursa, when the viscous secretion will exude. The evacuation of this hyper-secretion, together with the continued use of Burow's Solution may bring about a return to the normal. Sometimes, where the bursa has found an opening to the surface, the orifice may be of a pipe-like fistulous character in which the pipe or tube becomes an organised development with epithelial lining, and consequently this condition may be liable to run a chronic course until the tube is obliterated by the careful application of Silver Nitrate or pure Carbolic acid, and repeated enucleation.* In these circumstances, so long as there is any opening into the bursa or synovial sac, it cannot be too strongly urged that the strictest antiseptic precautions should be observed in order to avoid any septic complications. The boot is usually a hot-bed of micro-organisms and, consequently, the greatest care should be taken. To shut in any discharging surface is wrong ; but as a purely temporary measure, to be employed only during the time a boot is being worn, it might be advantageous to apply firstly a few layers of antiseptic gauze and then a piece of more impervious covering, such as plaster, to serve as a protection until the patient reaches home, when this should be removed and proper treatment carried out. In all

* See also " Bursal Sinus" in "Supplementary Hints."

joint cases, should there be any doubt in the Chiropodist's mind, particularly if there is any opening into a joint, it is urged that the case be referred at once to a medical practitioner.

As improvement ensues it may be of great advantage to adopt the protective and corrective methods of the flask-shaped cover or, according to circumstances, the crescent-shaped pad with the metatarsal strap. When the part is free from inflammation, passive movements of the great toe while the metatarsal bones are held (which has already been mentioned), are advisable, as they serve to stretch the muscles and to break down any adhesions that might be present. The illustration (Plate IV., Figs. 4 and 5) shows two types of pads which can be used for protection to the enlarged joint and which have this advantage : that the patient is able to remove them at night and replace them for day use. The first is made of felt, saponis adhesive-spread, and is graduated and perforated, with a loop at its anterior end, to which may be added an inter-digital wedge. This can be fitted over the joint and has sufficient adhesive property to keep it in place until such time as it is sufficiently moulded easily to fit the joint on replacement. The other type of pad is crescent-shaped with stockinette straps and is preferred by some patients. It is possible, of course, to make these pads of a more durable substance than felt, but the felt has the advantage of being cleansed by soaking in Lux and rinsing.

It might be well to point out that unless the

From above Side view

Fig.1.
DORSAL PAD

From above

Fig.2.
LONG DORSAL PAD

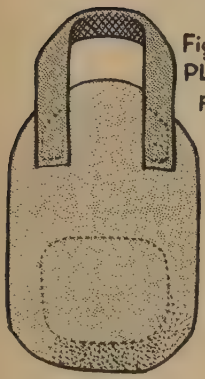
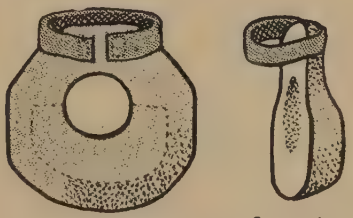


Fig.3.
PLANTAR PAD
From below



From above Side view

Fig.4.
PAD FOR FIRST METATARSO-PHALANGEAL JOINT

Fig.5.
PAD FOR BUNION

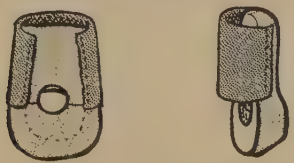


Fig.6.
PAD FOR DORSAL JOINT OF SMALLER TOES

PLATE IV.

TYPES OF FELT PADS

bootmaker is particularly instructed to make extra provision for the straightening of the great toe, it is obvious that he will fit the foot according to its existing affected contour; and if the toe is to be brought into better alignment, i.e., nearer to the middle line of the body, the inner side of the shoe must be sufficiently straight to allow of this restoration. It is perhaps better at this stage, if the patient is able to do so, for him to wear a less closely fitting ready-made boot or shoe with the straight inner side to the sole.

So far we have been concerned entirely with the first metatarso-phalangeal joint, but it is possible that a similar condition may occur also on the external surface of the fifth metatarso-phalangeal joint, causing an acute angle of the fifth toe. In this case the deviation of the toe is toward the middle line. Treatment would be practically the same; and the angle of the little toe may be considerably modified by use of the metatarsal strap.

Chapter VI

PADS AND PLASTERS

The nicety of adjustment of pads is an acquired art which comes only by keen observation and practice, and when patients are encountered who say that they object to padding, it generally means that their previous experience has been of ill-adapted and unscientific work. It should be realised that the body is made up of curves ; the foot itself has few, if any, perfectly straight lines ; even the shafts of the long bones assume a slight curve ; indeed the whole foot might be described as a series of curves. Pads, therefore, must always be adapted in accord with the alignment.

The general principle governing protective padding is equalisation or relief of pressure without disorganising general alignment. A pad, to be truly effective, must fill up hollows and take pressure from the sensitive part on its proximal side, without causing undue pressure on any part or so filling the boot or shoe that another region of the foot is adversely affected. In other words, protective padding must not disturb the integrity of the foot in walking, although it must relieve the pressure.

Corrective padding is employed to help to bring into alignment those deflections from the true that are sufficiently supple and amenable to such persuasive influence. At the same time it should be so designed as to assist in promoting the proper function of the foot.

In treating a bunion, where, as padding, is indicated the crescent-shaped piece which is placed on the proximal side of the head of the first metatarsal bone, special attention must be given to the following points:— (a) The pad must not be so broad as to press unduly on the plantar or dorsal marginal area of the bunion; (b) It must not be too deep, or so bulky that it throws the entire foot against the outer side of the boot. Due regard must be given to the bevelling.

As regards (a) too broad a pad will possibly impinge on the long extensor of the great toe and so interfere with its working, but if cut just short of this tendon it still gives quite sufficient protection. To carry the pad too far underneath (unless that is specially needed) might also be detrimental. In the case of (b) graduation is very important; the pad should be thick only where the hollows are deep.

Care must be taken to ensure that the footwear will permit the use of corrective padding. If the shoe is too pointed, the first phalanx cannot be straightened; if too short, it is of no use endeavouring to extend the toe by a plantar prop, as the shoe would oppose this. Even a short stocking or sock may interfere with this kind of padding, but where these restrictions do not exist, it makes all the difference to the possibilities of cure.

A bad corn on the apex of a toe or on the dorsi-phalangeal aspect can be greatly benefited if the toe be carefully straightened by a corrective pad on its plantar aspect aided, if necessary, by a similar pad on its

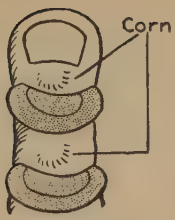


Fig. 1.
DORSAL PADS

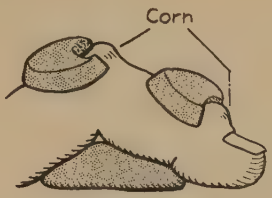


Fig. 2.
DORSAL & PLANTAR PADS

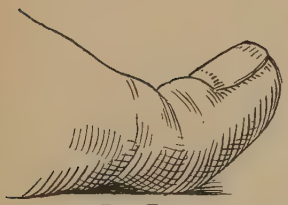


Fig. 3.
GREAT TOE
HYPEREXTENSION

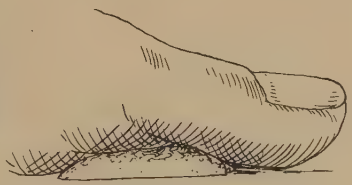


Fig. 4.
CORRECTIVE PLANTAR PAD
TO PROXIMAL PHALANX

Fig. 5.
HAMMER TOE
(2nd PHALANX)

Fig. 6.
PLANTAR & DORSAL
CORRECTIVE PADS

PLATE V.

TYPES OF FELT PADS

proximal dorsal aspect. (See Plate V., Fig. 2.) A plantar-phalangeal pad should extend from the base of the toe up to, but not over, the plantar aspect of the distal phalanx, and should be sufficient to straighten the toe without throwing it unduly to the top of the boot as might happen were too thick a pad used.

In cases of general flexion of all the smaller toes a long graduated pad could be placed in the same manner under the second, third, fourth, and fifth, with the view of straightening them. Similarly, a dorsal pad could be used by placing it on the proximal shafts of the three or four small toes.

Where soft corns form on the internal distal joints they will be found to be accompanied by contraction of the toe, which causes that distal joint to press unduly on the adjacent joint of the next inner toe. It will be seen that if the toe were straightened it would adapt itself to the curve of the next, instead of being in direct contact with its adjacent joint. The straightening can be brought about, if the toe is sufficiently supple, by a plantar toe-prop, in addition to which, if necessary, a thin felt plaster could be interposed between the two opposing joints. This plaster should be thicker at the base than at the apex and a perforation contrived over the corn-area. It is essential that this plaster should be graduated lest the toe be displaced outwardly, but it can be a little thicker at the base, where such an effect could not be possible.

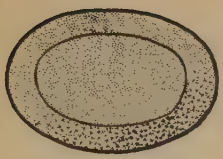


Fig. 1.
CENTRE PAD

Fig. 2.
CENTRE PAD IN POSITION
(Under Heads of the 3 middle metatarsals)

Fig. 3.
BROAD PAD
From below

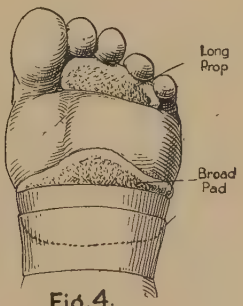


Fig. 4.

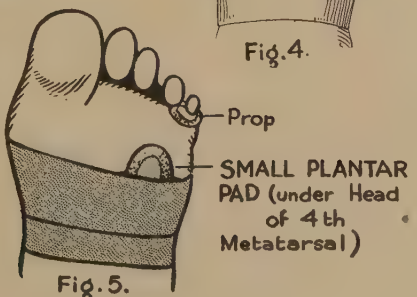


Fig. 5.

PLATE VI.
TYPES OF FELT PADS

A soft corn in the fourth webbing, i.e., between the fourth and fifth toes, is often a direct result of the flexion of the little toe with dropping of the head of the fourth metatarsal; the toe consequently rides higher than, and presses upon, the metatarso-phalangeal joint of the fourth. It is remarkable, in some cases, how effective a small pad (about the size of a shilling) can be, if placed on the proximal side of the head of the fourth metatarsal bone on the plantar surface of the foot. (See Plate VI, Fig. 5.) This has the effect of lifting the head of the bone and of restoring it to its normal position, in which case the fifth toe is no longer able to bring undue pressure to bear on this point. This pad should be about half an inch in thickness, and well bevelled round the edges. Its value is often enhanced by a small propping pad under the fifth toe used as a straightener. Indurations, or corns on the heads of the metatarsal bones, can be greatly helped by placing a larger plantar pad proximal to the heads of the three centre metatarsals. This also helps to overcome the tendency to dropping of the transverse arch. (See Plate VI, Fig. 2.)

Where the lateral ligaments of the metatarsal bones become relaxed, there is spreading of the foot in this region. This is specially noticeable in Hallux Valgus, but may occur independently of it. This spreading is always lessened by the reinforcing action of the metatarsal strap which has been described as a corrective to lateral spreading of the foot in the section dealing with

affections of the nail. This strap also serves to hold more firmly in its place the larger or smaller pad used for the plantar surface of the foot. (See Plate VI., Figs. 2 and 5.)

In addition to padding for protective or corrective purposes it may be necessary to use covering plasters of a thinner character placed directly over the denuded area for the time being, at any rate, after an operation. These afford adequate protection until the parts have become normal. In some cases, especially when patients object to the application of any plaster at all, protection to the denuded area can be afforded by using a covering of Collodion, or, if this seems to be too thin, a combination of Collodion and wool, arranged in that manner known as the " Cocoon " dressing. This is made by fashioning a thin pledget of cotton wool, placing it on the surface of the skin (which has already been moistened with Collodion) and applying a little Collodion over the edges of the wool so as to bind them firmly to the skin. When dry this " Cocoon " holds well. Many operators use that kind of Collodion known as flexile, but others prefer the acetone type which, in some respects, seems to be superior. This is often combined with a little Bismuth Carbonate by adding it to the Collodion already on the skin itself, or by applying it to the skin after the two substances have been mixed on a glass or china palette.

It must again be impressed upon the reader that any part showing a tendency to suppuration must not, on any account, be covered so as to exclude the air, except as a purely temporary measure. In order to prevent the

possibility of further infection until the patient reaches home, several thicknesses of antiseptic gauze should be applied, the edges of which should be strapped to the skin. It is obvious that the shutting-in of any septic lesion gives an opportunity for the rapid increase of bacteria.

It is sometimes useful to have a graduated plantar pad, which is made by splitting and peeling off the body of a piece of adhesive felt for three-quarters of its length, cutting this away and leaving the rest of full thickness. The thinner part is utilised as a protecting plaster covering the affected part towards the distal aspect, while the thicker part fits into the hollow of the foot, helping to take the weight of the body.* A point which should receive consideration is the density of the felt. The harder variety should necessarily be thinner, because it is less compressible. In plantar padding the height of the patient has to be reckoned with, for the degree of compression is greater in a tall person than it is in the case of a shorter patient, although the weight in each case may be the same.

The circular felt corn or bunion plaster can often be utilised, but it is not correct to use it in the shape in which it is sold. If one of these plasters be cut directly across the centre it forms two crescent-shaped pieces, one of which, when carefully bevelled, can be placed advantageously on the proximal side of a joint ; or if half the circumference of the felt be split and cut away, leaving the adhesive side, and the other half left in full thickness

* See "Supplementary Hints," under "Metatarsal Pad."

and bevelled, the whole could be used as a protection. The thicker portion of course should be placed on the proximal side.

Attention may now be drawn to the use of strapping to reinforce plasters or pads on the toes. It can be used to assist in holding on the covering of plasters; in such cases it is better placed as a bordering. It is often inadvisable to strap straight round a toe, because there are two dangers to be guarded against. One is of cutting into the softer tissues beneath the digit, and the other is that if the strapping is carried in between two toes over a joint the edge may crease and create a soft corn. If it must be carried round the toes, it should embrace the shaft of the digit only, and not pull upon the joint itself or drag the nail-wall against the nail-edge; also the principle of oblique or of the figure-of-eight strapping should always be regarded as important.

The operator should always be on the look-out in case a patient should have an idiosyncrasy to any particular adhesive that is used as a plaster. For example, a good many skins cannot tolerate the surgical rubber strapping. A few even have an antipathy to Zinc Oxide strapping; while there are skins which cannot stand any strapping whatsoever. At the same time the majority will allow the use of the ordinary Emplastrum Adhesive if applied on a slightly porous material, such as unbleached calico. Perhaps the least irritant metatarsal strap is that made of soap plaster on calico. This can be obtained in pieces about one yard by

PROPS

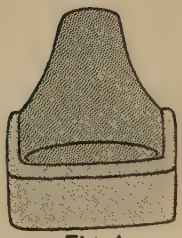


Fig. 1
From above

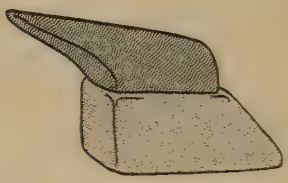


Fig. 2
Side view

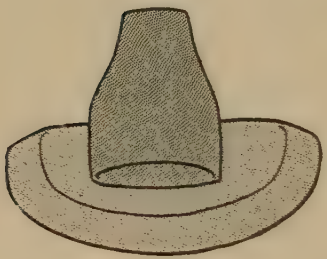


Fig. 3

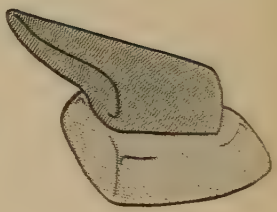


Fig 4

Fig. 5
From above

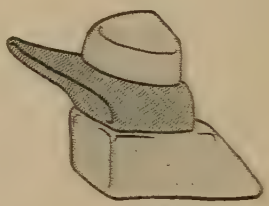


Fig. 6
Side view

COMBINED PAD

PLATE VII.

PROPS AND PADS

eighteen inches, from which strips one inch or more in width can be cut. This being in contact with the skin can, if needful, be reinforced without detriment by some of the stronger Zinc Oxide plaster applied over it. In some cases where virtually no adhesive can be used, it may be desirable to put a facing of muslin upon any strapping that comes in contact with the skin. A very useful form of metatarsal strap for patients who wish to take off their plaster nightly can be made by cutting a $1\frac{1}{2}$ inch strip of Welsh flannel or a thinner material of the kind, such as flesh-coloured "Viyella," from selvedge to selvedge, adding at each end about two inches of strapping. One end should be attached to the skin, the flannel taken round the foot, and the other end adhered to the flannel itself. If on each replacement of the strap the adhesive is attached in the same spot, it will be possible to use the strap several times before renewing the plaster-pieces. There is no doubt that in the treatment of Hallux Valgus, the best plaster for obtaining and maintaining a corrective pull on the great toe is soap-adhesive spread on chamois leather or on thin felt $\frac{1}{32}$nd inch. (See Plate III., Figs. 1, 3 and 4, p. 95.) Strips of soap-adhesive spread met-straps, one to one and a half inches in width and sixteen inches long, can be obtained ready cut from firms who specialise in chiropody supplies. One firm*, at the author's suggestion, spreads all but the last two inches of these straps with soap-adhesive, and uses Zinc Oxide for the remaining part. This makes a good

* Leslie and Co.

finishing end, and dispenses with the necessity of adding a piece of the Zinc Oxide by the Chiropodist. Perhaps the best form of strap is flexible cloth (flesh-coloured), made and finished on the principle just described. This is pliant enough, while remaining rigid in direct pull, to allow play of the foot in walking without the likelihood of the edges cutting the soft tissue, and on this account it can be taken directly round the foot without working on figure-of-eight lines, providing a sufficiently wide strip—say one and a half inches—is selected.

The elastic met-strap is largely sold for the purpose of restoring alignment of relaxed metatarsals. If one is carefully fitted, it is fairly serviceable, and keeps plantar pads in position. But its chief drawback as a corrective to the lateral spread of the foot is its elasticity, for it is apt to yield more than is wanted, except when it is made too tight, which, of course, is undesirable. In that case it yields, perforce, to the expansion of the foot in the act of walking, and then compresses itself in such a manner that it is detrimental to the superficial circulation. The ordinary met-strap is not a perfect arrangement, but when properly applied it gives a steady restorative action, and does this without again tightening on the soft tissues. An advantage of the elastic strap is that it can be removed at night, but for that particular purpose the flannel or Viyella contrivance seems to be the more serviceable.

One of the thinnest types of plaster used in Chiropody is that known as Papier Fayard et Blayn. This is

composed probably of some resinous material like euphorbium spread on tissue-paper, and is still employed by some practitioners for corns and joints. Its action is slightly stimulative.

It is important that the operator should warn patients, in the event of a plaster becoming displaced or turned up at the edges, that it should be at once removed. The edges of plasters are apt to adhere to the foot-covering, but this can be avoided, to a certain extent, by the use of a little powder, after all is adhered in place. Too much powder, however, is inadvisable, as it may work underneath the newly-adhered plaster and so loosen it. This difficulty may be overcome by using a little sheep's wool, instead of powder, winding it loosely round over all, especially between toes. Benzine, Ether, and Petrol all have the effect immediately of removing adherent plaster from the sock or stocking.

Owing to the dropping of one or more of the heads of the metatarsal bones, particularly of the fourth, and the consequent impinging upon the ramifications of one of the branches of the plantar nerves, the patient may be subjected to paroxysms of that neuralgic pain known as Metatarsalgia (and sometimes as "Morton's Toe").

This condition can be greatly alleviated by correcting the flexion and axial rotation of the toe, which can be done by propping with felt, in plaster or loop-on form, either under the affected toe, or with a long prop under the three centre toes, which would also correct the axial rotation. The fourth toe is especially subject to this

deflection. In addition, a pad should be placed beneath and proximal to the head of the metatarsal bone or bones. After this has been done, the whole should be enveloped with a metatarsal strap to restore the transverse alignment.

The dorsal surface of the toes, where there is necessity for protecting a joint, is well served by the use of the crescent-shaped pad placed on the shaft of the proximal phalanx. If more than one proximal phalangeal joint needs protection, a long piece of adhesive felt covering the bases of three or even four toes can be placed in the same position as the single pad, thereby ensuring protection from the weight of the shoe-vamp, at the same time tending to press down the toes to less acute flexion. (See Plate VIII., Figs. 1, 2 and 3, p. 118.) The others most likely to be affected by contraction are the dorsi-phalangeal and occasionally the dorsi-distal joints of the toes. In cases of Hammer Toe a great deal of pressure comes upon the proximal phalangeal joint owing to the manner in which it is forced upwards, thus receiving the weight of the shoe-upper. The thick pad on the proximal aspect of this joint is always of value, and if the toe is sufficiently supple, another pad can, with advantage, be used as a prop on the plantar surface, so adapted as to stretch the toe into a straightened position. (See Plate V., p. 105.) As in the case of the other joints, loop-pads which can be removed and replaced at will, can be adopted. Sometimes, when the skin and ligaments are so contracted as to prevent stretching of the toe, it may be a great

comfort to the patient if a pad known as the "Turtle" is employed. This type, which is cut from half-inch felt, should be slightly thinned down on its anterior surface and a hollow made on its under-surface to fit exactly over the protuding joint. (See Plate VIII., Figs. 9 and 10, p. 118.)

While on this subject it is well to mention one particular pathological condition which is occasionally met with in the region of the heel and in which the adhesive felt (about half an inch in thickness) is most useful. This is a small bony outgrowth on the plantar surface of the heel which is generally described as a Calcaneal Spur. This is found in the anterior region of the inner tubercle of the os calcis, near the attachment of the plantar fascia. This may be greatly relieved when an appropriate cushioning of the felt is placed immediately under the heel. The felt should be graduated forward to the bases of the metatarsal bones, and, as a preliminary, it may be adhered to the foot itself. If, however, it has constantly to be worn, it can be stuck down to the inside of the shoe in the corresponding position. It should be cut exactly to the shape of the heel of the shoe and graduated in exactly the same manner as just described. This material is superior to sponge rubber for the purpose as it does not "draw" the foot to the same extent. The author recently had a case where the osteophyte had been removed, but there was still a certain amount of tenderness which was not relieved by the use of sponge rubber in the shoe. However, much

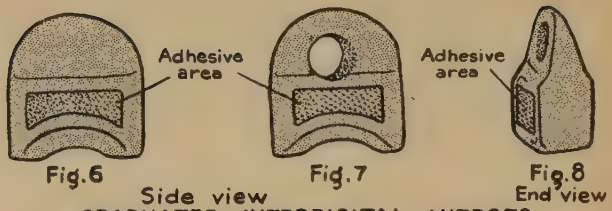


Fig. 6 Fig. 7 Fig. 8
Side view End view

GRADUATED INTERDIGITAL WEDGES

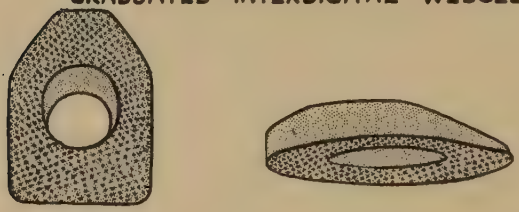


Fig. 9
From above

Fig. 10
Side view (*Tilted*)

TURTLE PAD

Fig. 1
From above

Fig. 4
From above

Fig. 2
From above
LONG DORSAL PADS

Fig. 3
Lateral view

Fig. 5
Side view
SINGLE DORSAL PAD

PLATE VIII.

TYPES OF FELT PADS

comfort was experienced when the rubber was replaced by the felt padding.

Occasionally patients may be suffering from slight weakness of the longitudinal arch, insufficient, perhaps, to need special apparatus. Great help may then be rendered by affixing a graduated oval piece of the half-inch felt, cut to fit the arch, immediately under it, which, at discretion, might be adhered either to the foot itself or to the waist of the shoe.

There are cases where it is an advantage to be able to take off and replace pads of different types. Loops of stockinette material can be attached to the felt pads so that they can be slipped over the toes and adjusted to keep the pads in position. Stockinette is suggested, because it is less likely to cut into the skin than a more rigid material, and its liability slightly to stretch can be taken into consideration when pads are made up. In some instances plain felt without adhesive can be used ; in others the felt can be thinly spread with soap-plaster. The latter has sufficient adhesiveness to assist the pad to mould itself to the part and so be more adjustable when it is taken off and replaced.

Props worn under the toes to straighten them can be adjusted by means of loops. (See Plate VII., p. 112.) These can be converted into combined pads by sewing another pad to the dorsal surface of the attachment.

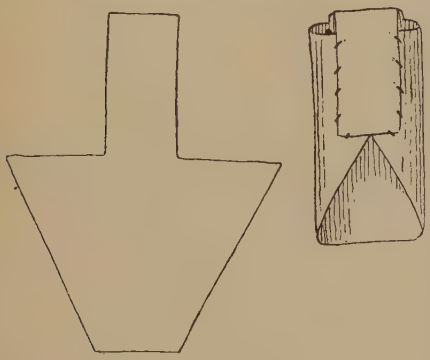
One of the varieties of loop-on pads has been found of the greatest service where a patient has had previous amputation of the fifth toe. Owing to the absence of

this toe the fourth toe loses a certain amount of lateral support, and consequently is subject to increasing contraction, with more or less inward axial rotation. This condition is liable to produce corns or other trouble on the apex, dorsum, or internal aspect. The usual measures taken are the prop for straightening and the dorsal protective pad, but in several cases the author has found the greatest possible advantage of a concocted three-piece pad, which can be slipped on and off the fourth toe. This can be made from one piece of felt partially divided into three sections, one of which acts as a prop to the middle and distal digits, another provides protection to the dorsal phalangeal joint, while the middle one, the largest of all, is fitted to the external lateral aspect of the fourth toe, and is of a size sufficiently large to take the place of the missing member. This combination of three pads is held together by a piece of stockinette which completes the circle, passing between the third and fourth toes to hold the end pad in place. The substitute toe pad and the accessory pads can all be shaped from the one piece of felt as shown here.

Like the other loop-on pads it can be kept clean by washing in "Lux" or some other appropriate soap cleanser that obviates rubbing. If as a result of use the pads become reduced in size owing to compression, additional pieces of felt can be added by sewing

them on, or by adhering pieces of ZO adhesive felt. As seen in the illustration, this series of pads should tend to combat the flexion of the fourth toe, protect the dorsal joint, and take the absent fifth toe's share of the lateral pressure. If once properly cut and adjusted, the principle of this toe-substitute pad may be permanently adopted.

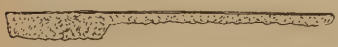
For either permanent or improvised replaceable pad the stockinette sleeves are the most useful (see Plate VII., Figs. 1-6, p. 112). This contrivance is shown with the pad sewn on to it for dorsal and plantar props, and it is remarkable to what a variety of uses it may be put when a removeable pad has to be improvised on the spur of the moment ; and for this reason it is highly desirable that practitioners should always keep a supply of these sleeves in reserve ready for immediate use. The crescent-shaped plantar prop, carefully cut from ZO felt, can be made to adhere to the sleeve, instead of to the toe, adjusted in such a manner as to build up protection that can be removed and replaced at will. The illustrations show the method of making this elaborated sleeve, which is termed a cot. It will be seen that



an extension of material is provided for the latter form which, when sewn over, makes an end covering. The graduated propping apex-felt, described on page 122, if appropriately adhered, could be fitted to such a contrivance. For a badly inflamed dorsal corn that needs daily protection, and perhaps the nightly compress, a turtle pad (see Plate VIII, Fig. 9), could be adhered to this instead of on the toe, and if carefully fitted will maintain its position. Modifications of this cap or cot can be contrived for the great toe, which are at times of distinct use where nail affection needs a removable protective day covering.

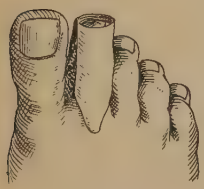
It is a common practice in plantar propping a contracted toe for apex trouble, first to place the plantar prop, and afterwards a covering piece over the end of the toe; but there is at times great advantage in combining the pad and cover in one piece of Zopla felt. This combination can be made by cutting a strip of thick felt, say, three inches long by about five-eighths wide, more or less, according to the size of the toe, and then stripping off part of the felt to about a third of its thickness to within about three-quarters of an inch of its end. This thick part should be bevelled so as to make an appropriate prop which should support the under part of the toe. The thinned portion of the felt must then be carried over the end of the toe, not too tightly, and then to the dorsum, to act as a covering piece. Providing the nail has been thoroughly reduced in bulk and length, this type of corrective protection is most successful, and can be used without a great amount of

supplementary strapping if the pad is carefully adhered. The accompanying illustrations show the pad as graduated and also as adhered to a cot.



Soft sheeps-wool, often quoted in the trade as "Chiropody Wool", is very useful in some cases. It "mats" better if it is not too well carded and should be used in fairly long wisps which, if wound round the toe not too tightly, can be so arranged as to make a replaceable protective ring. Some Chiropodists acquire great skill in its use for this purpose, and even contrive to make complete protective cots. In certain cases, where the normal cushioning pads of fat are lacking under and between the toes, much comfort can be afforded, especially to the aged, by improvising a bolster under a toe, bringing wisps of wool up between the toes.

In padding to straighten the Hallux, or to separate it from the second toe, there is no doubt that felt is the best material, providing, as it does, more solid resistance, thereby influencing alignment. Sponge and other rubber contrivances for this purpose are frequently used, and in some cases are successful, but the author has found that properly skived felt is far superior for habitual use. A sleeve with an attached interdigital wedge is here shown. Cotton-wool is ineffective, however



carefully arranged; but a little rolled lint can sometimes be used as a temporary substitute.

In closing this chapter it seems worth while to reiterate that it is only by patient observation and systematic persistence that complete success can be ensured in the art of padding.

Chapter VII

HYPERIDROSIS, BROMIDROSIS, ANIDROSIS

In the first of these affections of the feet there is pronounced excess of the normal amount of perspiration, and it may be considered to be associated with nerve affections or possibly with the faulty assimilation of food. Local sweating may follow debilitating diseases. The normal sweat secretion is closely related to the nervous system and is, therefore, subject to special manifestations where there is any debilitating or pathological cause. In confined spaces, such as boots, normal perspiration cannot readily evaporate, so that where there is predisposition to excessive perspiration the condensed products serve to keep the feet in a moist and clammy condition. The plantar surface of the foot and between the toes are more particularly affected by profuse sweating. The skin becomes macerated, the sole and perhaps the heel become whitened and puffy, the surrounding areas reddened, and excoriation in the circumstances, therefore, is easy. In some cases where excessive perspiration continues, it is associated with decomposition of the fatty acids, with the presence of bacteria, more particularly the Bacterium Foetidum,

and an unpleasant odour results. This latter condition is known as BROMIDROSIS.

In both these troubles treatment consists in keeping the feet absolutely clean, and avoiding excessively hot water or soaking. The free and regular use of a soft scrubbing brush for cleansing is of great assistance. The feet should be aerated at every opportunity, and foot-wear frequently changed. The feet should be sponged at least three times a day with some astringent lotion, such as a three per cent. Salicylic acid in Methylated spirit, followed by the use of a good powder, one of those for which the formulæ are given below, in the foot of the stocking or sock. Stockings and socks should be rinsed in Lysol solution before being sent to the laundry. In bad cases, should the patient not be under medical treatment, it is often advisable to induce him to consult a doctor.

Formulæ for Foot Powders. 1. Salicylic Acid, 3 parts ; Starch Flour, 10 parts ; Talcum, 87 parts ; mix well. 2. Tannoform, 4 parts ; Boracic Acid, 4 parts ; Talcum, 4 parts ; mix well.

When boots furnished with ornamental toe-caps are worn, a very useful method of helping the treatment of these complaints is to pierce through the existing semi-perforations of the toe-caps and the inner leather, so that air shall have access to the end of the boot or shoe. Usually there are from twelve to twenty or so of these indentations and they should all be punctured, with the

exception of three or four on each side nearest the sole. It has been found that this does not involve any risk of chill in ordinary weather. The most appropriate instrument for making these perforations would be a big carpet-needle, or one of those sharp little stilettos usually found in a lady's old-fashioned work-basket. The act of walking will help to ventilate the shoe by a kind of pumping action.

An American authority* greatly favours the use of Zinc Stearate combined with Sulphur, the proportions being one part of Flower of Sulphur to twenty parts of Zinc Stearate. This is sprinkled inside the sock or stocking daily until the affection is relieved.

The reverse condition, ANIDROSIS, is characterised by diminution or absence of sweating and is a local manifestation of constitutional disorder. The skin is abnormally dry and, consequently, predisposed to fissures and to the formation of clavi miliares. Should these minute corns be present they must first be removed, and directions should be given for daily massage with such an emollient as pure Olive Oil, Lano-Cyllin or Boracic Ointment ; Iodex, either in liquid or ointment form, can often be advantageously used. Any one of these well worked-in should materially help this complaint. Anidrosis is often accompanied by Fissured Heel, which can be extremely painful, and which is generally at its worst during the winter. The fissure should be cleansed with Hydrogen Peroxide (ten vols.), the cavity painted

* Dr. A. Bronston, S.B., M.D., of Chicago.

with Silver Nitrate (twenty-five per cent.), the edges then drawn together with narrow strips of Zinc Oxide strapping, and the whole again covered with the strapping, carrying it from the plantar surface of the heel upwards and over the edge towards the calf. In very bad cases it may be of advantage to utilise the cushioning properties of thin felt plaster in the same way as the strapping would be used in less serious cases ; it might be necessary to strip a certain amount from the surface.

When fissures occur between the toes, they are usually local manifestations of acidity, They should be cleansed with Hydrogen Peroxide and painted with Silver Nitrate, five per cent. solution ; or the patient should be advised to use night and morning the following composition :— ℞. Oil of White Birch, half drachm ; Lime Water, three drachms ; Olive Oil, to one ounce ; mix well. Sig., "Shake the Bottle. Paint between the toes twice daily." Wisps of animal wool should be placed loosely round the toes after painting.

In all these conditions everything possible to improve the circulation should be adopted. Thick woollen foot coverings, which promise greater warmth, should not be worn, unless the shoes are proportionately large, as by filling up the space they may impede instead of increase the circulation. It must also be realised that cold feet may be caused by internal circulatory conditions as well as by local constriction. Particular regard should be given not only to the width and contour of the sole of the boot or shoe, but also to the upper leather, which

should be sufficiently ample, so as to ensure freedom from vertical compression at the ends of the toes. The "blocked" toe-cap should have sufficient elevation to avoid this constriction.* It is quite possible to have a square-shaped boot, so square as to be positively ugly, and yet restricting movement of and circulation in the toes because of the insufficiency of the upper leather. Again, the shoe should not be laced too tightly over the dorsum of the foot as, besides restricting the blood-flow, it impedes the action of the foot in walking. If the lace seems to cause discomfort by pressing on the dorsum it is an advantage to shape a piece of thin felt a little shorter than the tongue of the shoe, trim off the adhesive border and adhere it to the under surface of the tongue.

It should be noted that those who habitually assume the sitting position for long periods constrict, at the back of the legs, the free return of the blood to the heart. Gentle stretching exercises, therefore, which elongate the veins at the back of the legs, are conducive to a greater flow of blood to the extremities. This was long ago recognised by Swedish masseurs. The use of a rubber nail-brush is very helpful to the surface of the skin, and might also be used to assist inunction of either the oleous or ointment remedies which have already been mentioned.

* See page 92.

Chapter VIII

THERAPEUTIC PREPARATIONS AND COMPOUNDS

Certain therapeutic preparations and compounds are so generally used in the practice of Chiropody that they are worthy of consideration in this treatise. At the same time the matter contained in the following pages must be regarded merely as a series of "Keynotes" on the subject. It is assumed that the reader has at least mastered the elementary principles of Chemistry and it is very desirable that the preparations enumerated in this section should be read-up in such works as "Squire's Companion to the British Pharmacopœia," Whitla's "Pharmacy, Therapeutics and Materia Medica," and Hale-White's "Materia Medica."

It is not proposed to adhere to a system of strict classification, but to describe various remedies from a Chiropodist's point of view.

Iodine is undoubtedly entitled to head the list. It is obtained from Kelp (the calcined ashes of seaweed), and it exists also in and is obtained from natural-occurring Iodides and Iodates. There are two particular spirituous preparations of Iodine :—(1) That more commonly employed in Chiropody—the weak tincture,

(Tinctura Iodi Mitis), made by dissolving Iodine in distilled water and alcohol, with the addition of Potassii Iodidum. The strength of this tincture is 1 in 40 or $2\frac{1}{2}$ per cent. It is used after the preparatory cleansing of the skin, being painted on as a preparation before operating, or as an after-dressing. It can be used as an antiseptic or as a counter-irritant, and can be applied in the reduction of chronic inflammation of various kinds and in hyperæmic condition of joints. When used for longer than a week, or in cases of very dry skin for a shorter time, it may have a tendency to irritate the surface of the skin, producing exfoliation or vesication.

(2) Tinctura Iodi Fort—the stronger tincture—has a strength of 1 in 10 or 10 per cent. This requires careful application and should be limited to one or two applications only, otherwise the effect might be too drastic. There is another form of Iodine known as the decolourised tincture, which is made by adding Ammonia to the ordinary tincture. It is considered that much of the virtue of Iodine is lost by this process; it is therefore not much used in Chiropody.

The disadvantage of the drying effect of spirituous compounds of Iodine when applied continuously is entirely eliminated if this remedy is used in the colloidal* form. It is claimed that Iodine in this form is capable of deeper penetration and, at the same time, of keeping the skin in a bland condition. It can therefore be applied freely and constantly either by inunction, or on

* Colloid, from the Greek Kolla, glue, and Eidos, appearance.

saturated wool, according to the apparent necessity of the case. It is distinctly beneficial when worked into enlarged joints. In addition to its penetrative action the massaging process increases circulation in the part and thus assists in carrying off the inflammatory products. In colloidal form Iodine can safely be applied to a broken surface.

Where there is evidence of a tendency towards rheumatism and where there is no break in the surface of the skin, that composition known as Iodex and Methyl-Salicylate (made up of Iodex and an Oil of Wintergreen preparation) is especially beneficial if rubbed in or applied on wool. Crooke's Collosol Iodine Oil is another very useful form of this type of remedy.

It should be borne in mind that occasionally patients may be encountered who have a special susceptibility, or idiosyncrasy, to any form of Iodine, and are adversely affected even by a small quantity. This condition, however, is not often met with. It should be noted that when starch powder is present on the skin, the application of Iodine may produce deep-blue colouring.

Compound Tincture of Benzoin (Friar's Balsam) is a dark reddish-brown liquid composed of Benzoin, Storax, Balsam of Tolu and Aloes in spirit. It is very useful as a protective and antiseptic coating for wounds and, therefore, benefits fissures between the toes. In combination with Tinct. Iodi it makes an excellent covering for chilblain. The Iodine should be painted on first and the part afterwards coated with the Friar's

Balsam and allowed to dry. It is sticky in character and if painted between toes the parts should be powdered after application. This sticky quality has the advantage, when working on soft corns, of giving the requisite "tackiness" to the skin and so assisting enucleation. When applied to broken surfaces it promotes granulation, although at first it conveys a sensation of smarting. It is well adapted for any excoriation, and has value as an antiseptic and also as a styptic.

Balsam of Peru is a deep orange-brown viscid liquid, of the consistency of treacle, obtained from the trunk of a tree grown in Central America. It is used in ointment form for promoting granulation and in the treatment of chilblain; it is also of use in the case of indolent ulcers. It has very soothing qualities and is antiseptic. In the ointment form it is a valuable after-treatment when verrucæ have been broken down. To make an ointment take Balsam one part, Purified Lard seven parts, and mix. The Balsam can also be incorporated with Zinc ointment, or, in small quantities, may even be used in its original form.

Lysol is a transparent brown syrupy liquid, which forms a clear solution with water, made by dissolving tar oils in neutral soap. It is used considerably in Chiropody as an antiseptic for instruments and for preparing the skin before operating; it is an exceptionally powerful bactericide. A fairly strong solution for all practical purposes is 1 in 100. When making the solution, it must be well shaken to ensure thorough

mixing. In its pure, undiluted state it is occasionally used for the quick disinfection of instruments.

Peroxide of Hydrogen. A watery solution of Hydrogen Peroxide containing 10-20 volumes of available Oxygen. It is a non-poisonous antiseptic and can be used as a spray or swab for cleaning out septic cavities. On coming in contact with pus or purulent matter the liquid immediately releases its Oxygen, thereby disinfecting the part. It is, therefore, a very desirable application for nail sulci prior to and while working on them. It should be borne in mind that the moment the activity of this liquid ceases it becomes inert and its antiseptic properties are lost, so that it should be dried-out and an appropriate after-dressing put in its place. It can with advantage be used prior to operating in the same manner as Carbolic solution, by placing saturated lint or wool upon a corn for five minutes before beginning ; this has the effect of rendering the keratinous tissue more workable. It has also a certain amount of styptic property. Peroxide of Hydrogen should always form part of the Chiropodist's working outfit.

Boracic or Boric Acid is found in volcanic districts, or can be prepared from Borax. It is a mild antiseptic and is used as a dressing for wounds and sensitive skins. It can be dusted on as a powder combined with Talc (equal parts of each), or combined with other powders. In this form it tends to neutralise foetid perspiration. Lint and wool prepared with this acid are usually dyed pink. It is employed also in ointment form ; the

following makes a good preparation :—Finely powdered Boric Acid 1 part, Paraffin Ointment (white) 9 parts. Mix well.

MERCURY.* The preparations most used in Chiropody are the Perchloride, which is the same as the Bichloride or Corrosive Sublimate, and the Mercuric Potassium Iodide. The solutions are used in the relative strengths of 1 in 1,500 of the Perchloride and 1 in 2,000-5,000 of the Iodide. They are both very powerful antiseptics and can be used for disinfecting feet, hands, towels, and sponges. They must not be used for surgical instruments owing to the corrosive action of Mercury upon steel.

CARBOLIC ACID is obtained by fractional distillation from Coal-Tar Oil. In its pure state it is known as Phenol. It is used as an aqueous solution in various strengths—1 in 60, 1 in 40, and 1 in 20. The 1 in 40 is a good all-round dilution. If a piece of lint or wool be saturated in this and applied on a corn and its area for five minutes before operating, an anæsthetic effect is produced upon the skin. Carbolic solutions are not recommended for compresses, as prolonged contact with the skin paralyses the nerve-endings and may ultimately produce gangrene. In making a solution it is most essential that the combination should be thoroughly well shaken, as it is possible that solitary globules of the acid might float in the water and have a caustic effect upon the skin. A saturated solution of the acid is sometimes employed for disinfecting instruments.

* See also Mercurochrome at the end of the chapter.

Aluminium Acetate Solution. A clear colourless liquid, derived from Alum, with an acid reaction and a faint odour of Acetic acid. It is produced from the double decomposition between Aluminium Sulphate and Calcium Acetate. It is a good antiseptic, and is most valuable when used with a compress in cases of Periostitis, Synovitis, or any septic trouble in the foot. When diluted with an equal part of distilled water it has been found to be more effective and less irritant ; it may even be applied in this form to a lacerated surface. It is also known as Burow's Solution. This preparation deteriorates if kept too long.

Nitric Acid. A clear, colourless liquid which is obtained by the decomposition of Nitrate of Soda or Potass by Sulphuric acid, and gives off characteristic choking fumes, and possesses even in diluted solution a strongly acid and corrosive action. Used as a caustic for verrucæ, it destroys the growth by oxidization.

Acetic Acid is produced by the destructive distillation of wood and can also be obtained by the oxidization of Ethyl Alcohol. Glacial Acetic is three times as strong as the ordinary acid, and contains 99 per cent. of real acid. It is occasionally used in the treatment of verrucæ, but the two following preparations have been given preference over the glacial and are known as substitution products of the acid. (1) Monochloracetic Acid. (2) Trichloracetic Acid. These are produced by the action of Nitric acid on Chloral Hydrate in the presence of sunlight. Monochloracetic, the more energetic of the

two, is applied to verrucæ every second or third day and has great penetrative power, desirable reaction being usually produced after the fourth or fifth application and sometimes before. Trichloracetic is slower in its action and is sometimes useful when the patient is unable to attend sufficiently often for treatment. A careful patient can himself be entrusted with this form in either diluted or full strength, to touch the part once or twice daily with an orange-stick or other piece of wood, assuming that the Chiropodist can see the case once weekly. The usual instructions as regards prevention of overflow beyond the margin of the growth should be very clearly given. In its effect it is usually the least painful of all these particular acids. It has a toughening effect upon the growth; at the time of operation this can be lessened by the application of Liquor Potassæ.

Chromic Acid is obtained in small purplish-red crystals from the action of Sulphuric acid on Bichromate of Potassium. This acid is a powerful caustic and a solution of 1 in 4 of water is sometimes used for treating verrucæ. In working with Chromic acid the adjacent parts should be well protected by plaster or ointment, and a piece of moist lint should be at hand ready to absorb superfluous liquid. It should be kept with great care in well-stoppered amber-tinted glass bottles. Note that if Chromic acid comes in contact with strong Alcohol, Ether or Glycerine it immediately explodes with violence.

Salicylic Acid is obtained from Salicin, Oil of Wintergreen, Tea Berry and other sources. It is antiseptic

and an energetic germicide, and can be used as a lotion, an ointment, or to form a dusting powder. A 3 per cent. solution in Methylated Spirit or Spirits of Wine makes a useful astringent for daily painting in such infected cavities as may be found in the nail area, and can also be used for sponging over the feet generally in cases of Hyperidrosis and relaxation of the tissues. The mild ointment much used in some armies for sweating and sore feet when marching is made up of Salicylic acid 2 parts, Benzoin 10 parts, Mutton fat 98 parts; or Salicylic acid 2 parts, Benzoic acid 1 part, prepared Suet 97 parts. A stronger ointment, used in the treatment of verruca, is composed of 60 per cent. Salicylic acid in Basilicon ointment (Ungt. Resinæ); dissolved in Collodion it is employed for the same purpose. A useful formula is Salicylic acid 1 drachm, Extractum Cannabis Indicae 5 grains, Collodion to one ounce. The percentage of Salicylic acid could be increased, while Creasote in the same proportion is considered to be superior to Cannabis Indicae. It is also incorporated in plasters in varying strengths according to necessity. The much advertised "Corn Silks" are generally composed with Salicylic acid as the principal ingredient. A good dusting powder between toes and for the foot generally is compounded as follows:—Salicylic acid 3 parts, Boric acid 10 parts, Talcum 87 parts; mix well. The acid is also put up in the form of impregnated gauze and wool.

Tannic Acid, which is obtained from Nut Galls, is

a good styptic and local astringent, and can be used in combination with Glycerine, with spirit, or in solution as a foot-bath. Some Chiropodists find the pure powder or its solution in spirit effective for hardening nail sulci.

Formic Aldehyde. The Aldehyde of Formic acid. Aldehydes are produced by the oxidization of alcohols. Formalin is a 40 per cent. aqueous solution of Formic Aldehyde. The vapour emanating from this liquid may be an irritant to mucous membrane, but is not corrosive. It is used by Chiropodists in cabinets for the purpose of sterilising such articles as strops and other things which cannot be placed in a liquid disinfectant or be boiled, as it is a powerful antiseptic and disinfectant. The watery solution can be used in cases of Bromidrosis with advantage, but if used as a foot bath frequently it should not be stronger than 1 in 800. A strong solution applied to the skin hardens it in a manner that is most difficult to soften. Formalin is very useful in sterilising a shoe which has been used for a septic foot. A pledget of wool, saturated with the 40 per cent. solution and surrounded with dry wool could be inserted into the toe of the shoe, which should then be wrapped up in several coverings of paper to prevent the vapour from escaping, and left for six hours.

Silver Nitrate or Lunar Caustic is produced by the interaction of Nitric acid and Silver, which takes the form of colourless crystals. To make the rods known as Lunar Caustic, the crystals are fused and

poured into moulds. It is a valuable escharotic and excites superficial inflammation in combination with the albumen of the skin; it turns the part black under the influence of light. Silver Nitrate is antiseptic, astringent, hæmostatic, irritant, and caustic according to the strength of the application. A 10 per cent. solution causes contraction of the blood vessels. A 50 per cent. solution acts as a superficial caustic by coagulating the albumen of the tissues and destroying their vitality. This process limits its penetrative power. The action of Silver Nitrate of toughening the skin is often utilised for hardening the nail groove for the time being, which saves the constant application of another astringent for that purpose. It is often useful for cauterising the bottom of the cavity from which a corn has been extracted, thereby facilitating the obliteration of the sac or bursal cavity. It is particularly applicable to skin of the moist type. Occasionally patients are found who have an idiosyncrasy to Silver Nitrate and from its use may experience troublesome symptoms. This usually occurs with people who have dry skins, so that care should be exercised in such conditions. Whenever it is necessary to nullify the action of Nitrate of Silver an immediate application of a strong solution of Sodium Chloride (salt) breaks it down and neutralises its action.

Caustic Potash. A preparation of the metal Potassium in hard, white, deliquescent pencils. It is a strong caustic and is used in the destruction of verrucæ. It sets up a powerful irritation in consequence of its

combining with the water of those parts to which it is applied and, in addition, it forms a combination with the tissue-elements to produce alkaline albuminates. It has extreme penetration and may produce necrosis of the deeper tissues, and there is less restriction to its penetrative power than is the case with most other corrosives, such as, especially, the acids. For this reason those who use this method of treating verrucæ combine it with Gum Arabic or with Calcium Oxide (Vienna Paste). It can then be worked into the part or left on for 10-15 minutes on each occasion. Some operators then neutralise the part with dilute vinegar or Acetic acid.

Liquor Potassæ is a 5 per cent. solution of the foregoing and is sufficiently weak to be used freely in the treatment of nail grooves and to soften callous. It is, however, well to neutralise it and dry out any cavities after use.

Strong Solution of Ferric Chloride. This preparation of iron is a dark reddish-brown liquid and is a powerful local styptic, astringent, and escharotic. In Chiropody, when used as a styptic and astringent, it is diluted at least to half strength. Where it is considered desirable to use a preparation of Iron as a paint to the nail groove, the Tinct Ferri Chlor (popularly known as "Steel Drops") is usually selected. This is made by mixing one part of the strong solution of Ferric Chloride with one part of Alcohol and two parts of distilled Water, making a 1 in 4 strength. A very useful

styptic wool is manufactured which contains Ferric Chloride.

Diluted Solution of Lead Sub-Acetate. This is made by combining the strong solution of Lead Sub-acetate with Alcohol and Distilled Water, and is known as Goulard's Lotion. It is recommended as an astringent and sedative in cases of inflammation. It has little or no antiseptic properties, but its sedative action helps to disperse congestion and so relieves the condition, especially where there is a gouty tendency.

Liquid Extract of Hamamelis (Witch Hazel). A preparation of the bark or leaves of Hamamelidis Virginiana; this is also known as Hazeline and Pond's Extract. Its chief virtue is in a specific action upon the blood vessels, and, when used in full strength or preferably when half diluted with water, saturated Boric lint or wool makes an excellent compress for inflamed, lacerated, or bruised tissue. It is a safe remedy which can be recommended to patients for their own use in such conditions.

Ichthyol Sulphonate. This reddish-brown syrupy liquid is prepared from an oil distilled from certain fossil deposits, principally fish, found in the Austrian Tyrol. It is used an as application to ulcerated surfaces and for chilblain, and is made up as an ointment or in combination with Glycerine. During the War a most successful synthetic form was evolved, which has since been preferred by many as being more stable in its content. It bears the proprietary name of Subitol. A 25 per cent.

solution of this in Glycerine is largely used by Chiropodists under the name SUBITINE.

ALUM is the result of the action of Aluminium on Potassium Sulphate or of Aluminium on Ammonium Sulphate; it is astringent and styptic. A saturated solution of Alum in water (i.e., as much Alum as the water will absorb), forms an excellent astringent in cases of Bromidrosis. In the powdered state it can be applied to the nail-groove when the tissue surrounding the nail is tender. Alum is soluble in water and in glycerine, but not in alcohol. Burnt Alum, prepared by depriving Alum of its water by means of heat, is considerably stronger and may produce escharotic action when applied to the tissues; it is, therefore, used in cases of hypergranulation, or "proud flesh," which is sometimes a complication of Ingrowing Nail.

THYMOL IODIDE. A brown insoluble powder prepared by the action of Thymol on Iodides. It contains about 45 per cent. of Iodine, and is also known as ARISTOL. It is antiseptic and deodorant and as powder may be dusted over ulcers or applied in the form of a 10 per cent. ointment or oil. It is considered to be a good substitute for Iodoform, an antiseptic powder largely used in surgery, the pungent odour of which renders it unsuitable in Chiropody, so that Thymol Iodide is used by operators instead.

COLLODION is a preparation of Pyroxylin dissolved in either a mixture of Ether and Alcohol, or in Acetone. It is chiefly used for coating abraded surfaces or small,

clean cuts with a protective film. In Chiropody it is utilised particularly for combining with the felt packing for nail sulci or, with a thin layer of cotton wool, to make the "cocoon" dressing. Collodion is often used as a vehicle for other agents, such as Benzoin and Tannic acid, as an antiseptic, and is combined with Carbonate of Bismuth to make a thicker coating for skin-surface or for the nail-groove.

CHINOSOL is a product of Quinine. It is a powerful antiseptic, disinfectant, and deodorant and is used by some operators in the strength of 1 in 1,000 as a spray for the skin, or for the surgical cleansing of instruments.

WATER. (For a long time water was regarded as an element, but towards the end of the seventeenth century the celebrated chemist Lavoisier demonstrated it to be a compound consisting of 2 parts by weight of Hydrogen to 16 of Oxygen).

Water in Chiropody has many uses. It may be utilized for therapeutic purposes as a cold or hot compress or for fomentation. For these and most other purposes it should be either distilled or boiled for at least ten minutes before use. Unboiled water may contain pathologic bacteria which may possibly infect the tissues when applied to broken surfaces. It is worth remembering that too many hot baths or any partial bath that is of too high a temperature or too prolonged may conduce to loss of bodily heat by relaxing the tissues beyond the normal, and so lessening resistance to subsequent cold. The Revulsive Foot Bath consists of alternate Hot Water

(98-104 degrees for two to five minutes) and Cold (45-66 degrees for five to twenty seconds) and is of much service in stimulating circulation of the blood, if the feet are placed repeatedly first in the hot water and then in the cold and are afterwards well rubbed with the bath towel. When used for a compress a suitable antiseptic is usually added to the water, or the desired antiseptic effect can be obtained by saturating wool or lint previously impregnated with Boric or Salicylic acid. Fomentations are local baths or circumscribed hot packs.

Poultices. There is no doubt that a poultice will by its moist heat relieve tension and pain in many cases of inflamed surface or joint trouble. It should, however, be noted that the old-fashioned bread poultice is ruled out as not being antiseptic. If Linseed be used it is considered essential that the water with which it is moistened should first be boiled, the Linseed meal added in sufficient quantity to make the required consistency, and then the hot mass should be applied on a linen cloth to the affected part. This poultice should be used only where no suppuration actually is taking place, but it can be applied before suppuration in cases where it is desirable to induce it.

The old-fashioned poultice has been greatly superseded by the Kaolin Cataplasm. Kaolin (China Clay) is a fine white clay derived from the decomposition of the felspar of granite rocks. When very finely ground and washed it is used as a form of Fuller's Earth. The cataplasm is usually composed of Kaolin combined with

such ingredients as Boric acid, Thymol, Methyl Salicylate, Oil of Peppermint, and Glycerine. A trade preparation of this type which is of superior consistency is known as "Antiphlogistine" and is very efficient in inflammatory conditions. In deep-seated inflammation, such as Synovitis and Periostitis, it causes a superficial hyperæmia which decreases the congestion in the affected parts and induces reparative process owing to its osmotic antiseptic properties. This particular cataplasm can be used on broken or ulcerated tissue with great benefit and should be prepared according to the directions supplied with the container.

MERCUROCHROME, a combination of Mercury with a dye, is becoming increasingly recognised as a valuable general antiseptic. It is very penetrative, does not burn, irritate, or interfere with normal granulation; and it is also a good prophylactic against infection, and an excellent agent in the sterilization of infected wounds. Mercurochrome "220" is the Sodium salt of Dibromo-Oxy-Mercury-Fluorescein (see Martindale). A two per cent. solution is the best strength to use; this may be an aqueous or spiritous solution, the latter, of course, assists evaporation. It is an admirable dressing for chilblains in the early stage or when broken; and it can be painted daily on septic areas with good effect, as it retains the germicidal action of Mercury without the usual reaction; and as it does not precipitate protein it is very penetrative. The following formula makes an excellent quick-drying pre-operative and

after-dressing :—dissolve two grammes Mercurochrome in thirty-three cc. distilled water and add fifty-five cc. rectified spirit and ten cc. acetone. When the solution has stood for a few hours a slight precipitate forms which can be filtered off. Mercurochrome is much used in U.S.A., and is strongly advocated by Joseph Lelyveld, Chief of the Foot Clinic of Boston, Mass. It has a characteristic cherry-red stain which remains for a considerable time, and unless patients are familiar with its use, they should be informed of this, as they might subsequently be alarmed. For removing the stain from the hands pumice soap or stone will effect a good deal, but should this fail a hypochlorite solution should be used.

ACRIFLAVINE, a coal-tar dye product, is much used in the London Foot Hospital as a one-in-a-thousand aqueous solution. " A very powerful antiseptic which acts in the presence of organic matter, stimulates connective tissue-cells, does not destroy leucocytes and therapeutically is perhaps the best antiseptic " (Hale-White). It is often used as a compress, but has the drawback that should any of the solution escape from under the waterproof covering it will stain linen yellow which is not easily removed. Stains on the hands can be obliterated by dilute Hydrochloric or Sulphurous acid.

Chapter IX

INSTRUMENTS

It is not proposed to enter into an elaborate dissertation on the subject of instruments generally, but it does seem useful to indicate how the Chiropodist may help to keep his instruments in good order.

In regard to sharpening instruments it might be observed that a Chiropodist who is unable to sharpen his own implements is in the position of a motorist who does not understand his engine. Both are entirely dependent upon others and may at any time be held up for lack of a little technical knowledge. The practitioner may call in the assistance of a cutler periodically, but as each time an instrument is used it is the better for attention to its cutting-edge, he should have at hand (although of course never within sight of his patient) a small outfit for the purpose. This outfit usually consists of a small, fine carborundum or a Turkey stone hone, a bottle of Lysol solution (50 per cent.), some rags, and a piece of American cloth or similar material to protect the surface of the table on which these may be used. Of course there should also be a strop made of carborundum dressed leather, or

blocked buckskin, the last of which, known as Worth's Razor Strop, seems to be the most durable and appropriate. In addition, the outfit might contain details for cleaning instruments, such as Rotten Stone, Oakey's Polishing Powder, or Vim, some Cloudy Ammonia, whiting, a piece of buckskin stretched on a wooden base, on which to rub metal handles (this is sold under the name of "Busibuff"), and some chamois leather or buckskin, on which to place and clean instruments.

In order to be able to keep his instruments in good condition, the operator must fully realise that the cutting-edge of his scalpel or lancet should be absolutely in the true centre of the blade. There is an apparatus now on sale which promises to keep a true edge. It consists of two steel balls which revolve in juxtaposition between which the blade is passed backwards and forwards a few times. This straightens the fine edge to its true centre. For larger cutlery there is another apparatus consisting of two plates of hardened steel, which are so joined as to present a V-shaped groove, along which the knife-edge is drawn to take off any deviation and to make a fine central edge. These points are mentioned in order to impress upon the operator that the great object in sharpening an instrument is to achieve a perfectly true central edge. It follows that any honing or stropping done with a heavy hand is bound to turn the edge to one side, therefore extreme lightness of hand is necessary when using the hone or strop. Some Lysol solution having been poured on the hone the

amount of pressure upon the blade should be just sufficient to drive before the blade the bulk of the liquid. The reason that so many unsuccessful would-be sharpeners obtain no good results is because they bear too heavily on hone or strop. The Lysol is used instead of oil because it is antiseptic as well as lubricant. The art of acquiring a perfectly true edge is so worth while that it might be to the practitioner's advantage to find a cutler who, for a consideration, would instruct him in the setting of an instrument. The theory of setting the edges of cutting tools is the formation of two equalised flat facets or bevels ; it is their intersection that forms the cutting-edge. The graduation of this bevel is a matter for due consideration if the right degree of cutting power is to be obtained. With many instruments there is an advantage in having a rather abrupt "set" or bevel. This is especially the case where deep penetration is to be avoided, as in cutting away some nail-surfaces, and, in some plantar corn preliminary work, the degree of thickness of the blade will determine to some extent the acuteness of the bevel. For some scalpels or lancets, the use of a very smooth hone is not so desirable, as there should be a slightly rough finish to the edge, so that in the enucleation of corns a better grip of the callous can be obtained with the edge of the cutting instrument.

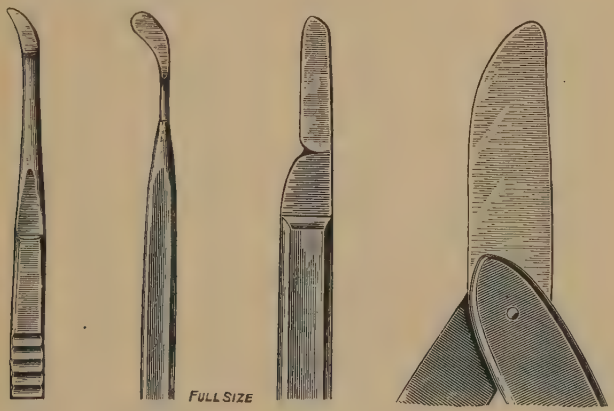
It is best to polish handles, scales of lancets, etc., before sharpening the blades. If blades are marked in any way the " Busibuff " should be used with one of the polishing powders already suggested. Plated work and handles,

should be well cleaned with Ammonia solution and whiting, and afterwards polished. Stains on blades can be removed by rubbing with fine emery cloth (No.00), or can be made to vanish during the process of setting. Having placed the hone on a flat, firm surface already covered by the American cloth, sufficient Lysol solution to wet the whole surface of the hone should be poured on it. The instrument should be drawn backwards and forwards lightly but firmly, an equal number of times in a series of sixes at a time, first laying the blade perfectly flat on the hone, and inclining it very slightly, until the cutting-edge is the principal part in contact with the hone. As the blade is lightly moved it should carry before it the bulk of the Lysol fluid, thus indicating that the edge is in contact with the hone. Pressing too hard on the edge or at too acute an angle would have the effect of bending round the cutting-edge and spoiling it. Some of the smaller instruments can be sharpened better by making a circular motion, which might perhaps be indicated by the term " making loops " with the blade, whilst in the process of working it backwards and forwards. This "looping" can be applied also to the sharpening of chisels. Care should be taken to equalise the surface of the hone by not honing the instrument in one position only. If one part of the hone is habitually used the face will become depressed and incapable of setting a true edge. The occasional use of a strong magnifying glass for examining the cutting-edges end-on is of great assistance in gauging their trueness.

The next operation is stropping. This must also be practised with a light hand. Some practitioners obtain good results by placing the back of the instrument on the strop and making short drawing motions of each edge alternately by a slight twist of the fingers and thumb, using the back as a pivot in the same way as in stropping a razor. Lastly, the blade should be lightly stropped upon the soft finishing side of the strop; blades and handles should be carefully wiped with a soft chamois leather; and the instruments sterilised in the usual manner. They are then ready for use.

Those operators who confine themselves to the use of large cutting instruments throughout their work must naturally be at a disadvantage. It must be obvious that the depth of a blade determines the curve at which the operator works in cutting away hard skin. Some of the best instruments for small work are those with only one-eighth inch blades, set in handles shaped as nearly as possible octagonally. This particular pattern allows twisting of the blade between fingers and thumb without moving the hand, and is especially valuable in the enucleation of cavities and in treating corns between the toes. The different shapes of blades of course enable the helomata to be approached from varying angles. In this respect the author suggests the advantage of becoming accustomed to the use of the loose-scaled lancet. On the whole there is very little advantage in having the point directly in the centre of the apex of the blade. If the blade is so ground that the point is at the

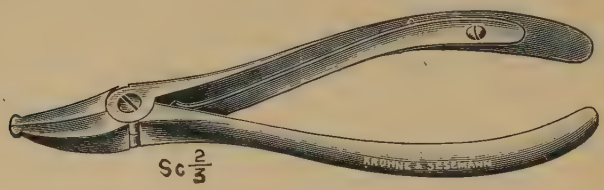
front of the cutting-edge, it can be utilised to a much greater extent. For operating on the plantar surface of the foot the " fish-belly " blade is the best, and it is an advantage to dispense with the point in this instrument for preliminary working. Smaller and finer types of blades are needed in dealing with calloused nail-groove (Onychophosis), for the enucleation of the small corns found in this part.



FINE POINTED | GOLF-CLUB TYPE | NAIL SCALPEL | ROUNDED BLADE LANCET

For straight cutting of the nails the use of convex or straight-sided nippers is essential ; a smaller pair of concave nippers should be at hand for preliminary work in taking the sliver of nail from its side in cases of Onychocryptosis. The author has suggested to Krohne and Sesemann, instrument makers, that these nippers should be made with ball-pointed ends, which have the

distinct advantage of preventing laceration of the sulcus in the process of taking away the graduated sliver.



NIPPERS WITH BALL-POINTED ENDS

Supplementary instruments for this operation would be the gouge and the nail-cleaver; by means of the latter the silver can gradually be separated until clear of the nail-plate. Again it is urged that whatever instrument is used in the bifurcating process of the splinter, it should be one that presents a blunted surface on that part which is in direct contact with the softer under-tissues, such as the nail-bed and sulcus. Reverting to the subject of nippers, there is one type which in many catalogues is termed "Scissor" nipper. It is a diminutive instrument with scissor-handles which is very effective in removing spiculæ of nail or skin. It is an advantage to lessen the fine point at the apex of this instrument by rubbing on the hone. Or, better still, a modification of this pattern which the firm previously mentioned have made, gives the blunted ends with curved handles, which obviate obstruction of view in working. This is a distinct advantage. The fairly strong spring forceps, used in lifting minute fractions of

nail or skin from cavities, for the same reason should be curved on the same principle.

The surgical dressing scissor with its blunted points is best fitted for cutting old plasters off the foot. The risk entailed in employing the pointed-blade scissor should bar its use, at any rate for this purpose.

Reference has been made in the section on soft corns to the advantage of using the hatchet-shaped or " golf-stick " form of instrument in which, like the hatchet, it is only the extreme end that forms the cutting-edge. A long blade is likely to cut the soft adjoining integument while the operator is working between the toes.

In closing this section it is desirable to impress upon the operator that he should do his utmost to cultivate what may be termed " instrument sensitiveness," so that even with such a thing as nippers he could feel that he was working gently and firmly, and in using scalpel or lancet feel through them what he is touching and working on in much the same way as a blind man is able to take in his surroundings and regulate his progress through his stick. Furthermore, the resemblance between a blind man's stick and a Chiropodist's instrument is that it is seldom, if ever, like other sticks which are used for leaning upon; the Chiropodist should never lean on his instrument. It should always be lightly manipulated, ready to recede; sufficient force must be used to send it forward, but it must never be borne upon.

Chapter X

GENERAL OBSERVATIONS

In a work of this description it seems both desirable and important that the Chiropodist should be reminded that the bulk of his scientific knowledge is derived from the studies and researches of anatomists, physiologists, and pathologists and, therefore, that it behoves him to defer to the opinions and pronouncements of medical practitioners. It should always be remembered that if a patient is under medical supervision the doctor is the ruling authority. The Chiropodist cannot give any contrary advice without incurring grave responsibility. As a rule, any reliable Chiropodist will find the doctor quite willing to allow him control of his particular department. But when the Chiropodist is aware that a patient is under such medical treatment as is likely to be in any way relevant to the condition of the feet, it is always desirable that he should be quite sure that the doctor approves of the patient's receiving chiropodial attention. This is satisfactory alike for Patient, Doctor, and Chiropodist.

A case in point may be quoted: A patient visited a Chiropodist and was found to be suffering from,

apparently, Onychocryptosis, but it was noticed also that there was general œdema of the feet. Upon enquiry it was found that the patient was under treatment for this condition, in fact that it was a local manifestation of a constitutional trouble. Instead, therefore, of making a thorough exploration for splinter immediately, the Chiropodist painted the groove with Tinct. Ferri Perchlor. and asked the patient to tell his doctor that he awaited the decision of the latter whether or not he should explore and take operative measures later. The doctor postponed any sort of operation and advised the continuance of the Tincture of Iron application, explaining subsequently that as the patient was suffering from an attack of heart trouble, improvement in the constitutional condition would bring about dispersion of the œdema and that then, if necessary, the nail could be cleared, the patient being in a more fit condition. As a matter of fact, with the subsidence of the swelling the pain in the nail entirely disappeared. This instance goes to show the necessity of referring any case that may appear to have a constitutional and not a local cause to a medical man. And it may not be out of place here to suggest that the Chiropodist should confine his advice strictly to local affections of the foot, and should not venture upon any suggestion that might be interpreted as referring to constitutional treatment.

Within its proper limitations the work of the Chiropodist is extraordinarily useful and has manifold phases. Its extent is so large that there is no excuse for the practitioner

to be tempted to deal with anything that is outside his own particular sphere of action. To enucleate properly painful corns, which press on the contiguous nerves, in such a manner as to prevent recurrence; effectively to remove verrucæ; to make a painful enlarged joint comfortable by means of judicious protection which will not in any way adversely affect the function of that joint; to clear and train nail-edges so that the patient may be free from pain in those regions; to work without causing pain, at all times using the proper antiseptic precautions; all these are within the scope of the Chiropodist. His services are in great demand and the demand will be still greater when it is realised by the community at large that the work of competent operators is thoroughly efficient and leaves nothing to be desired.

But the Chiropodist must realise that there are limitations to Chiropody. It needs only the study of such a work as Sir Arthur Keith's "Menders of the Maimed," fully to realise the complexity of the organisation of the human body, and the amount of persistent and devoted study which has to be given by scientifically trained minds in order to bring about co-ordinated treatment of comparatively small defects. It is evident, therefore, that it would be highly detrimental for the Chiropodist even to endeavour to go outside his own particular sphere and treat complaints other than purely local affections of the foot.

If satisfactory results do not follow skilled chiropodial treatment, the practitioner must assume that other than

purely local factors are responsible, and in such cases it would be his duty to refer patients to Doctors of Medicine. Should a patient who is seeking treatment by a Chiropodist give evidence of such a constitutional weakness as, for example, gout, diabetes, or hæmophillia it would be best for the Chiropodist to assure himself that the patient's medical attendant is aware that his patient is seeking chiropodial relief and that the doctor approves of such a course.

The operator should be in agreement and in the same line of thought with his patient, so far as possible, even though in some details this attitude might be at variance with his own conceptions. A patient, for instance, may have found by experience that a certain method, and certain details in carrying out the treatment, have suited his particular case. Every deference, therefore, should be shown towards this attitude, short of giving the wrong treatment.

Deliberate working always inspires confidence. If the operator is working quickly he can well afford to pause every now and then, just to demonstrate his perfect control. In picking-up or replacing instruments he should act with careful deliberation and, above all, avoid any clatter. Should a patient be inclined to flinch, the operator should immediately lift his hand and caution the patient that it is safer to keep the foot quite still. The habit should be sedulously cultivated of momentarily withdrawing the instrument-hand at the first sign of nervousness. It is hardly necessary to impress upon

the operator that an easy working position of the patient's foot, consistent with the general comfort of the patient, is most important and decidedly facilitates operating; operating may be made difficult or painful by non-observance of this precaution. It is important, too, that the light should be in just the right position. Free position of the hands to facilitate operating easily is very necessary to obtain the delicate and proper touch. After the preliminary paring with tensified skin, that well-balanced, light curving action with the scalpel or lancet which just engages and lifts the exact portion of epidermis so that it can be cut and cleared, without dragging on the softer tissues, is the chief object to be attained. It is to be observed that when a cavity is comparatively clear, and then for a time is left alone, the cells, which were previously soft, often become sufficiently hardened by the action of the air to enable another small section to be removed when the operator returns to that particular part.

A few hints on the improvisation of the necessary operating apparatus, when a Chiropodist attends a patient at the residence of the latter, may perhaps not be out of place. It is well worth the practitioner's while to cultivate a ready appreciation of the contents of the room, so that he can immediately decide what articles of furniture he will require, and where they should be placed so that the best light be available. The highest chair would naturally be assigned to the patient, the foot would rest upon a slightly lower one, furnished with

a cushion and a towel, and the operator should if possible occupy a similar or a lower seat. In a hotel bedroom, however, there is, as a rule, very limited seating accommodation, perhaps only two chairs. In that case a cushion or pillow covered with a towel and placed on the operator's lap would serve for the foot to rest upon. It may sometimes be found, if the Chiropodist appears to hesitate as to how a room should be arranged, that the patient, with the sole object of helping him, may make suggestions which, if adopted, would hamper rather than assist. It will be readily appreciated, therefore, that it is a great asset to be able quickly to grasp the possibilities of the contents of an apartment. Facilities for washing the hands, as well as a supply of towels, should be asked for. Just a little care in arranging the foot towel would facilitate the removal of debris resulting from the operation.

A patient while lying in bed can be attended to from the bottom of the bed by turning back the clothes covering the feet, remembering always that a towel should be placed under them. The operator should work at the side, arranging that the bed itself is between him and the light. A clean towel also should be used upon which to place such instruments as cannot be kept on their trays. A small sterilised napkin might be carried for this purpose in the instrument case. Another very useful adjunct which may also be included in the case is a piece of that transparent material known as "Cellophane," which rather resembles flexible glass, and, as it is impervious to acids and spirit, is well

adapted, for instance, as a protection to the polished surface of a table.

The extent to which the Chiropodist is permitted to advise on the subject of foot-clothing is often determined by the type of patient. There are those patients who insist in any circumstances upon wearing that particular kind of shoe that pleases them. On the other hand, there is the patient who is only too glad of guidance in this important matter. In all these cases discernment of character and, above all, tact are absolutely necessary, and these qualities should be assiduously cultivated, developed, and exercised. It is always advisable to take particular notice of the type and kind of shoe which the patient is wearing and, should it be necessary, the Chiropodist should give advice as to the benefit of the straight inner line, as to sufficiency of the upper leather, and the length of the shoe; and if he feels compelled to point out that the shape or type of the shoe which is being worn is wrong, he should exercise very great tact and give his reasons very clearly to prove why it is wrong. Wholesale condemnation of all types of shoes except one particular kind must inevitably have the effect of prejudicing patients against the Chiropodist's advice on the subject.

As regards hose, it is lamentable that some of the quite good types and shapes of socks and stockings which are being sold at the present time are made with bulky and hard side-seams which, in themselves, are quite sufficient to cause corns and other forms of discomfort. It is often

found, more often than not, that the sides of the feet are deeply indented by these seams. If the patient insists upon wearing that particular type of hose, he can only be advised to wear them inside out and so present a smooth surface to the skin. Frequent change of foot-wear should always be recommended. A shoe which presses unduly, but slightly, on one particular part would naturally do less harm if it were worn for only a short time, and in that respect the foot would be kept in better condition. One seldom hears any general warning given regarding the inadvisability of lacing boots and shoes too tightly. Dr. T. S. Ellis in his writings laid great emphasis upon " the changing posture of the Tarsus in the act of rising on tip-toe." This, obviously, can be considerably interfered with by lacing too tightly, and thus retarding the increased dorsal convexity. There are some cases of disorganisation of the foot which may be chiefly due to the lacing of the shoe coming so far proximally that the bow has to be tied too near the region of the annular ligament. Probably one of the reasons that this produces discomfort is because the Tibialis Anticus tendon is impinged upon, and its free action interfered with. It is evident that the ideal boot is one that makes it possible for the wearer to have a flexible arch.

It is sometimes well worth while to induce a patient to exercise his toes, more than he has been in the habit of doing, by flexing them for, say, thirty times every morning before rising and again at night. Some patients

who declare that they have no time for massage, which would benefit them, will often manage to find time to use a foot-roller in their bedrooms, whereby they can increase the circulation and strength of the plantar muscles. There is appropriate apparatus designed for this purpose, but the author has often obtained excellent results from the use of rubber bicycle handles, sometimes called " shock-absorbers," which are at once simple and not cumbrous to use. The patient, being seated, should place a foot on the roller and work it backwards and forwards, so that the roller massages the muscles of the plantar surface from heel to ball. If continued for a sufficiently long period this exercise often does a great deal to restore circulation and strengthen the intrinsic muscles, which help to straighten the toes upon the ground.* Another simple method of increasing circulation in the sole is to place a long-handled bath-brush on the floor, bristles uppermost, and while standing with one foot on the handle, the patient should move the other smartly backwards and forwards over the brush, steadying the body by placing a hand against the wall of the bathroom. The dorsal surface of the foot, of course, can be more easily brushed by hand. Excellent results can be obtained by the use of a rubber brush, especially when there is need for stimulating the superior surface of the heel-bone at the insertion of the big tendon.

* Several rubber massage rollers have been put on the market which can be used in this manner, if the carpet is covered with a towel.

Iodex, if necessary, can be worked in with this form of brush. These brushes can be obtained from most chemists or rubber depots and are often sold as "toilet complexion" brushes.

Some reference must be made to Flat Foot, a condition which is very prevalent especially among those who are obliged to remain on their feet for long periods.

There is displacement particularly of the Os Calcis and the other tarsal bones, which is evidenced by a bulging of the inner surface of the foot, the length of which is increased while the outer border is slightly shortened. This pathological condition is found in varying degrees, and according to the adaptation of the foot to this abnormality adhesions may more or less confirm the foot in its deflexion from the true. If the sufferer were observed from the rear while standing four-square, with the toes pointing directly forward, the Achilles Tendon, which should show a vertical line from the calf-muscle down to the heel, will actually curve towards the middle line of the body, owing to the tilting inwards of the Os Calcis. The principal characteristic of Flat Foot appears to be muscle-weakness, although there are other predisposing causes. Many acute illnesses, such as rheumatic fever, where the fibrous tissues of the body are especially attacked, may tend to contribute to the trouble.

Most authorities recommend proper foot-clothing, rest, and exercises, with manipulative and mechanical

treatment. In extreme cases orthopædic surgeons resort to operative measures, and are able to restore the position of the foot by such processes as wrenching the foot and placing it in plaster of Paris. Sometimes massage is advised, and when the muscles have been toned-up by manipulation, the patient is instructed in such exercises as will prove restorative such as, for example, raising the body slowly from heel to toe and after counting, say, nine in that position, coming slowly to ground on the outside border of the foot. Another good exercise is to rotate the ankle by holding the leg up from the ground, and causing the toes to describe a curve round and round to the fullest possible capacity for something like thirty to forty times twice or more daily.

In cases where the patient is obliged to be on his feet for considerable periods, an accurately fitting support is of distinct value. Such a support is best devised by taking a plaster of Paris model of the foot, so that perfect adjustment can be ensured. It is here that advantage should be taken of the expert knowledge possessed by the orthopædic instrument maker. If carelessly fitted, artificial supports are apt to cause an undue amount of pressure upon the muscles and vessels under the arch. It is hardly necessary to point out that severe cases of Flat Foot should not be treated by the Chiropodist, but should be referred to an orthopædic surgeon. However, there are many slighter cases which may not call for special treatment and which may respond to prophylactic measures enhanced by chiropodial treatment.

SUPPLEMENTARY HINTS

Blisters (Bullae). Prophylaxis : Feet of sedentary people will not suddenly respond to traumatic demand without preliminary toning-up. Avoid much hot water, (see Footbaths), massage skin by rubbing or scrubbing with soft nailbrush. For sole, place long-handled bath-brush on floor, bristles upwards, stand on handle with one foot and move the other to and fro on surface of brush. Use spirit twice or thrice daily ; Bay Rum and distilled Witch Hazel equal parts ; or three per cent. solution Acid Salicyl. in spirit. Occasional dabbing with one per cent. Picric acid in equal parts of surgical spirit and water is useful. Knotty or large-seamed socks should be worn inside out ; soft, absorbent material that gives smooth surface and cushioning against leather is best. Soaping the stocking inside before use is a popular and useful precaution. Puncture toecaps of shoes where feasible. Treatment : when evacuating blister, if keratinous folds are likely to press upon the sensitive base, it may be advisable to cut away all loose tissue and dress with Subitine ; tinct. Benz. Co. ; Zinc Oxide and Balsam of Peru ointment ; or Picric acid one per cent. sol. There are cases where blisters, if not tense and painful, can have

surface painted with Iodine and the fluid be allowed to re-absorb, instead of opening up. If needful, the part can be covered with protective plaster.

BROMIDROSIS. Wash daily, but not soak, in tepid water, and scrub (if not too tender) with either a rubber or some other softish nailbrush with Lysol soap ten per cent.; revulsive salt-water footbaths are good; change hose two or three times daily; puncture toecaps of shoes; aeration of feet at every opportunity and exposure to sun's rays. Potass. Permang., or Formalin, one in 200, footbaths twice daily. "Sanitas" good as bath. Remember that hose should be washed in Lysol water. Mechanical or other vibratory stimulation is worth consideration. If patient in bad state of health, advise seeing medical practitioner.

BUNION. According to stage of affection. Acute: Hot Iodine or saline foment or footbaths (see FOOTBATHS) Antiphlogistine; compresses of dilute Aluminium Acetate sol.; or Lead Acetate lotion. Consider advisability of complete or partial rest; gout-boot; or cut out section from shoe and replace with balloon patch. Subacute: Inunction with Iodex; Iodex cum Meth. Salicyl.; ungt. Salicyl. comp.; Crooke's Collosol Iodine Oil, (facilitating absorption with thermal lamp), or this medicament may be applied on lint with waterproof cover at night. If painting the part daily with weak tincture of Iodine, a pause is usually desirable after eight days, in view of drying effect on skin surface. The more concentrated character of the strong tincture entails still greater

caution in this respect. Replaceable or other padding and usual remedial measures for Hallus Valgus.

Bursal Sinus. With chronic Bursitis, where hypersecretion has found an opening to the skin surface, the sinus is lined with an organised endothelium. In conjunction with, or following reduction of the inflammatory symptoms, obliteration of this fistulous opening is essential to cure. As in this type of lesion the cells are very tough and resistant, the use of forms of Thiosinaminum are helpful in softening, as this chemical promotes absorption of fibrous tissue. It can be used in forty per cent plaster form, or in the unguent form known as Fibrolysin, or that of Iodolysin which is stated (Martindale) to contain forty-three per cent. Thiosinamin and forty-seven per cent. Iodine.

Bursitis. Allay inflammation with antiseptic poultices, compresses, or fomentations; promote absorption of hypersecretion with forms of Iodine (paint on, or use colloidal inunction with or without thermal lamp). Mechanical vibration of surrounding area. If bursal sac exposed: frequent footbaths of Iodine (one drm. to pint hot water; or saline, (one and a half drms. to pint hot water). Touch cavity with tinct. Iodi fort., or pure Carbolic (latter preferable if patient is using foot), and afterwards wash out with spirit spray. Beware of infection from shoe; cover area with antiseptic gauze (not Mercuric if Iodine is being used). If communicating with joint capsule, or if from focal infection, refer to medical practitioner.

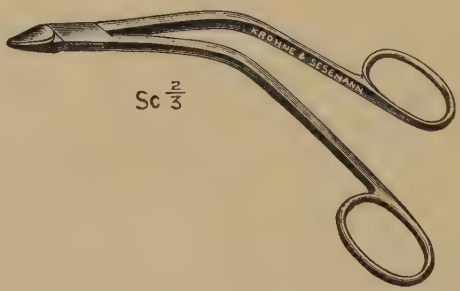
CALLOUS. In some of the drier skins the borders of the sole and heel which come in contact with the seams of the shoes are apt to have hardened ridges. Some patients with dry skins object to the usual emollients, such as Lanoline, Vaseline, etc., on account of their greasy character. As an alternative, equal parts of Eau de Cologne and lemon juice, rubbed in once or twice daily, might be tried. The patient can also reduce excess of callous by the regular use of pumice-stone, or cuttle fish, while the foot is wet.

CHILBLAIN (additional to p. 29). No. 7 Paraffin, (see Martindale's Codex), can be applied to broken and unbroken Chilblain. Melt small quantity in cup or jar placed in saucepan of boiling water (*water must not be allowed to splash into wax.*) Paint the melted wax over affected part, apply thin layer of sterile gauze, repeat painting over the gauze, then cover with more layers; renew daily. A handy preparation of this for immediate use is the Ambrine candle, from which the wax can be dropped on to small surfaces. Painting with one per cent. solution Picric acid is good. These treatments are applicable also to burns. Consider two per cent. Mercurochrome solution as being soothing, antiseptic and healing. The No. 7 Paraffin mentioned above is highly recommended in cases of burns, wounds and frost-bite. It was greatly valued in the War.

CORNS, SOFT. Probably the most difficult type of soft corn to manipulate is that which is found in the webbing between the fourth and fifth toes. The heaping-up of

macerated epithelium and general looseness of the integument present somewhat of a complication and, in addition, it is not at all unusual to find corneous development on the internal distal area of the fifth toe at point of contact. There are instruments in the form of "toe separators" which can be obtained to facilitate access to this area, but the author has found that with practice the left hand manipulation is to be preferred, as it combines both separation and skin tensification. Reference has already been made to Friars Balsam (p. 17), as giving "tackiness" to the surface of the skin when needed. In addition, the use of a powder will still further facilitate working: the Tannic acid compound, mentioned on p. 32, is useful, but preference might be given to the following extremely good formula: Bismuth Carb. and Zinc Oxide, of each take half ounce and add Acid Salicyl. twenty-four grains. Mix. This composition is adherent in spite of moisture, and has a good astringent and antiseptic action for this particular purpose, and it can also be used for regular application where a drying agent is needed. Reference has already been made in this connection to the desirability of small-sized cutting instruments; the small golf-club shape is particularly recommended (see p. 153), as it can be used effectively from all angles. Valuable assistance in separating loosened tissue is rendered by the quite small nippers, known as "scissor nippers," illustrated on p. 172. This instrument is generally supplied fashioned quite straight, with sharp points, but the author has found that

certain modifications of the shape are essential in attaining the best results in working. The very sharp points are liable inadvertently to penetrate the soft tissue when the instrument is pressed down to nip. It has been mentioned in another place that these points can be blunted by carefully rubbing them down on the hone. As has already been suggested in regard to the spring forceps, the curving of the handles, which enables the operator to work between the toes without obstruction to the line of sight, is a great advantage. The instrument-maker could alter existing instruments by heating with the blow-pipe and bending the handles to the required curve. The accompanying illustration shows the instrument as produced by Krohne and Sesemann in the proper shape.



Corns, Hard. Apart from the essential antiseptic preparation before operating, remember the ten minutes compress of Carbolic, one in forty solution, as an analgesic, or Liq. Potassae as a softener ; in cold weather there is much gain in warming these applications.

Consider Mercurochrome (two per cent.) as an after-dressing.

Drill. The electrically-driven rotary drill is now almost generally adopted in Chiropody, especially for reducing nail hypertrophy. The author has found that when using the drill it is best to sit so as to face the same direction as the patient, for this position facilitates the application of the burr in its safest plane of working, for example, from the matrix toward the free edge of the nail, and in the opposite direction to that in which the burr is rotating. The choice of the burr is important, and the desirability of the cone or clubbed-end shape, whether it be made of steel or carborundum, is worth considering. The latter material has many advocates, and both are amenable to mechanical cleansing with the steel brush and the usual forms of sterilisation, or they can be passed through a flame. It is remarkable to what an extent complete control can be acquired by practice. A delicate sense of touch, even with a drill, can be acquired, especially when using, for fine work, a "right-angle-piece" burr holder. An occasional dip into the Lysol solution or cold water while working is useful to prevent overheating of the burr.

Files. The File or Rasp, so necessary to the Chiropodist, is often the least æsthetic in appearance of all his instruments. Even the most thorough wire-brushing and sterilisation do not improve its looks, owing to its dark roughened surface. Fortunately the use of rustless steel has brought about a great improvement in this

respect, and there are now bright looking and flexible files to be had, which are far superior to the older types.

FOOTBATHS. In addition to mechanical cleansing, the massaging effect of scrubbing, and towel friction, there is the ANTISEPTIC footbath for tender feet with excoriations, broken chilblains, heel-fissures and other septic conditions: hot water that has been previously boiled and Hydrogen Peroxide (10 vols.) equal parts; Potass. Permanganate, enough crystals to colour water a deep pink; tinct. Iodi mit., one dram to a pint. All have good oxydising effect. SALINE: 1½ drm. Sodium Chloride (common salt), to the pint, soak feet for 20-30 minutes; a good preparation for other dressings which, if necessary, can be repeated twice or thrice daily. While realising the immense advantages of soaking the feet as a therapeutic measure, both for local and more remote effects, it must be remembered that, as mentioned on p. 33, there are possibilities of pathological results from repeated soaking in hot water, and that there are cases, for instance, of interdigital fissures and bad soft corns where merely cleansing the surface of the skin with a soft brush or flannel for a time, without immersion, is of the greatest benefit. When, under medical advice, or from other reasons, soaking the feet cannot be dispensed with, it must be considered what measures for correction of the consequences can be suggested. Brief immersions under the cold water tap, immediately following the hot-bath, or pouring the contents of the cold water bottle over the feet, are of use and in most cases quite safe if followed by a

good rubbing with the bath towel. Sponging with spirit is most valuable in toning up the surface of the foot, especially between the toes, an area which at all times should receive close attention. Gentle friction between the toes with a folded bath towel should be urged, as the sodden condition produced by constantly soaking the feet in very hot weather, is not only unhygienic, but is conducive to such conditions as fissured webs, soft corns and even forms of favus (ringworm). The advantages of a good borated talc or other powder should be considered and enough sheepswool used between the toes. Sea-water bathing is very useful. Of course, the very great benefits of aeration and the sun bath (whenever possible), should be pointed out to patients. A useful method of massaging the sole of the foot is given on p. 164. The use of other chemicals may be considered, such as the sedative effect of Sulphate of Magnesia (Epsom Salts), about ½ lb. to a footbath in cases of general superficial discomfort, burning, aching, etc. The addition to the bath of Sanitas, a type of Turpentine preparation, which contains Hydrogen Peroxide, Thymol, soluble Camphor, etc., is stimulant and deodorant. Formosyl, or Lysoform, combinations of Lysol and Formalin, are desirable as being both antiseptic and astringent. To people of sedentary occupations the sudden demand made upon the feet during holidays should be anticipated by preparatory treatment for some days before leaving home, by massage or loofah frictions, and the above-mentioned astringent foot-baths, or two or

three of a saturated Alum solution. The much advertised foot-bath saltrates, which are to a great extent made up of the carbonates and sulphates of such alkalies as magnesium, calcium, potassium and sodium, although they do not quite justify the claim that the "corns drop out," are sometimes quite useful in reducing the acidity of the skin surface. If used in hot baths the desirability of not maintaining the water at too great a heat, with its consequent relaxation of the skin, should be considered.

HALLUX VALGUS. There are numerous forms of appliances, such as braces and splints, which are advocated for straightening the great toe. I may mention two types which, in certain cases are satisfactory in practice. One, known as the "Toe Post," consists of a strip of metal fitted into the insole of a properly shaped shoe, so as to hold the great toe in a stall in a corrected or over-corrected position, for which the patient would need to have hose with a separate compartment for the digit. A full description of this contrivance can be found in orthopædic works. The other is also intended to correct the eversion by mechanical means. In form it is a steel lever, covered with leather and felt, and the desired inward corrective pull is brought about by means of leather straps; this is intended to be worn during the night. It is claimed that this instrument can be worn in the daytime as well, but most careful adjustment would be needed, and the method is not often quite satisfactory. The best known of these appliances

are the Krohne Lever Splint and the Biggs' Bunion Lever.

There is one phase of this affection which is sometimes met with when the whole metatarsal area, including the lateral supporting tissues, is in a very relaxed and flaccid condition, in fact, the everted hallux might come into the category of a "flail" joint. The second toe may completely overlap the great toe and the general mal-alignment makes it most difficult for walking and standing. As in such a case there are no adhesions, it is often possible to bring about a restoration of alignment of sufficient degree as to enable the patient to take a certain amount of exercise. The replaceable cot interdigital wedge (illustrated on p. 123), is of service, and should the usual plaster corrective for any reason not be indicated, a broad elastic metatarsal band is often useful. With some patients the restriction of circulation occasionally caused by an elastic band which is sufficiently strong to give proper support, would suggest the advantage of something less tensile. With aged people there are distinct advantages in the use of a firm flannel strip $1\frac{1}{4}$ inches wide and about 30 to 40 inches in length. This can either be sewn to an already shaped cot-cap, or, by turning back the end of the flannel for about $1\frac{1}{2}$ inches and sewing this at the sides, a cot-cap can be contrived to fit over the great toe. The flannel strip should then be steadily drawn back towards the heel, so creating an inward pull of the toe. This pull should be maintained by passing the strip round the heel forward on the outside and up

over the dorsum, then down under, and twice round, the metatarsal area, exerting a steady lateral support. It can then be fastened to its own material either by the addition of a piece of adhesive strapping (as with the Viyella bands, see p. 113), or with a small safety pin. Usually the most desirable position for fastening off is on the dorsum over the third and fourth metatarsal.

HAMMER TOE. Note the almost invariable predisposing factor of Hallux Valgus. For this purpose consider the desirability of the interdigital wedge and met. strap, in addition to correcting toe flexion.

HANDS, CARE OF OPERATOR'S OWN. Maintain sensibility of touch ; keep fingers supple by massage, stretching, and rolling a walnut in palm with fingers of the same hand ; inunction with olive oil (working in the oil as one would put on a new glove) ; or when washing the hands utilising the soap as a massaging agent. Chlorinated Soda, with or without the pumice-stone or its powder, for stains ; Hydrogen Peroxide for nail-borders. The use of lemon juice for keeping skin smooth and white, or, necessary, white cotton gloves could be worn at night. When carrying bags and holding vibrator use, chiefly, the left hand. When washing the hands utilize the soap as a massaging agent with which to work into the muscles. Short fingernails for an operator are a distinct advantage, both from the cleansing point of view and to obviate the chances of the nail edge impinging on the patient's foot while working.

HEELS, FISSURED. (Additional to p. 127.) Where

possible reduce keratinous edges, by paring at right angles or smoothing with the drill, and dress cavity with the B.I.P.P. (Bismuth sub-Nitrate 1, Iodoform 2, with Liquid Paraffin sufficient to make thick paste), with or without small wisp of sterile gauze, cover with ZO stockinette, thin felt plaster; same process with Ichthyol, Subitine, or Balsam of Peru. With these applications fissures can be left covered for about three days to four. Also consider in very painful cases the use of Paraffin Wax No. 7, or Ambrine (see under CHILBLAIN, p. 170).

MACERATION BETWEEN TOES. Encourage proper drying; advise against too much hot water; paint daily with Silver Nitrate (five per cent. in Spirit. Etheris Nit.). If acidity present, Ol. Betulæ Comp. (see p. 128); or astringent powders (which see). In obstinate cases with hyperaemia, vesication and fissures, consider ringworm possibilities and reference to a dermatologist.

NAILS. ONYCHOCRYPTOSIS. In a sodden groove the elusiveness of the partially detached splinter sometimes presents difficulty in working, as in the case of a soft corn, there is an advantage in using Friar's Balsam, with or without the Bismuth Carb. mixture. The spirit spray soon washes out these chemicals when clearance is required. Until positive as to the sulci being quite clear of all spiculæ and debris, avoid hard packing. A useful preparatory method of treating difficult conditions is to utilise diluted Liquor Potassæ as follows:

A piece of cotton wool is saturated with a solution of

Liquor Potassæ, 2 drams to the ounce of water, and inserted under nail edge and kept moist, being renewed daily for a few days. (This method of treatment of ingrowing nail was advocated by Mr. Norton of St. Mary's Hospital.) . To prevent oozing, Gutta Percha tissue, or better still, fishskin tissue, could be wrapped round the toe.

Hypergranulation. (Supplementary to p. 73.) It is recommended that the pulverised Lead Nitrate be favourably considered in most phases of this condition.

Onychogryposis. Reduce with drill or nippers and scalpel ; with rubber thumb glove and file. Bismuth Carb. or Resin pulv. gives surface tackiness ; or twenty-four hours preparation of nail with compress of dilute Liquor Potassæ one in four, or Saponis Molle (pure) makes working more easy.

Onychophosis. Either calloused groove or with minute corns : H_2O_2 ; follow with Liq. Potassæ for five minutes, then clear. Or apply Ungt. Acid. Salicylic fifteen per cent., leave on for four days, then clear. Use leather or felt pack with I.W.

Operating. The advantage of firm but light handling of the foot needs no emphasising. It seems difficult sometimes to combine the two ; but there must be direct gentle pressure, and in moving from one part to another, the hands should be entirely lifted from the foot, as the passage of the fingers over the surface of some skins induces flinching. For working on hypersensitive plantar surfaces it is sometimes desirable to wrap the

entire foot in folds of a towel, leaving exposed only the part to be operated upon. There are cases when, as a preliminary to treating an inflamed corn or joint, the act of stroking gently with the finger tips for a few minutes has a very soothing effect, with or without some analgesic agent, such as Carbolic oil, Meth. Salicyl. Co., or Collosol Iodine oil. It will also often help to give confidence to new patients and tend to assure them of the operator's gentleness.

Pads, Long Curved, Adhesive. There is sometimes an advantage to use a type of long curved adhesive pad, [here illustrated] especially when quite short fifth toes

are encountered, for it acts as a corrective to that oblique inward turn to which that member is subject, and helps the consequent weight-bearing strain on the external borders of the toe. It is also of service in counteracting the internal contact of the fifth toe to the head of the fourth metatarsal—a predisposing cause to soft corns. Start adherence of pad to the internal surface and continue out and back with gentle strain.

Plantar Metatarso-Phalangeal Region. Under civilised conditions there is probably no part of the foot more particularly subject to morbid change than that

generally known as the "tread." Forms of hypertrophy and atrophy in this region manifest themselves, especially where the heads of the metartarsal bones which, normally freely supplied with natural padding, gradually lose their protective cushioning owing to the continuous limitation of mobility entailed by foot-wear. When there is gradual attrition of this padding, the efforts of Nature to replace it are not necessarily by way of evenly distributed callous, but may take the form of indurations, linear or ring-like, or perhaps the ordinary corns. In cases where the heads of the bones are lacking in natural cushioning, the callous will conform in contour to the respective heads, and sometimes when the concentrations fill the interstices longitudinally between the respective heads of the bones, they are a great source of pain and discomfort. After operation, obviously the most practical manner of bringing about an improved condition is some form of substitute padding; and in many cases, as this padding needs to be of a continuous character, the advantage of the replaceable pad should be considered. Figure 3 on plate 4 illustrates a most useful form of loop-on pad. A slightly adhesive surface, such as is provided by soap-spread felt, is suffiicent to retain the pad in position when first applied, but this can be easily removed so that the pad can be worn only during the day. This Oval Saponis Graduated Pad (Solport), for brevity's sake known as the "O.S.G.," is on the market. It can be looped over the second or third toe and then placed under the centre of the foot. Variations

of this principle can be contrived such as, for instance, adding pieces of Zopla felt to the pad where needful, or the whole can be covered with chamois leather, white kid or buckskin. Providing that the loop is made of stockinette material, the possibility of its dragging too much on the toe is minimised; if the loop stretches much by use it can be placed over two toes instead of one, or the loop wound round with sheep's wool.

Sulci. Tenderness from relaxed condition: apply Salt (Sodium Chloride), saturated solution, or in powder form, twice daily; or Silver Nitrate sol., twenty-five per cent.; tinct. Ferri Perchlor.; or Tannin.

Verruca. In certain suspected cases, or those which, temporarily, cannot receive attention, the application of plaster patches of Salicylic fifteen per cent., or Pyrogallic forty per cent. immediately over the affected area, which should be then covered by another protective plaster, is useful and safe for the patient himself to use provided he is shown exactly how to do it and advised to renew it weekly or thereabouts. Where the Salicylic application is used in ointment form, there is distinct advantage in incorporating other remedies possessing analgesic properties. E. K. Burnett, a leading American authority, advocates the use of the following formula: R. Acid. Salicylic. five drms, Camphor, five grs., Choral Hydrate five grs., Cerate, well stiffened, q.s. to one ounce. Misce. Where for certain reasons the patient cannot submit to any other treatment a preparation in Lanolin of forty per cent. Calcium Carb., or

Calcium Phos., applied at night, or more frequently, has been successful. Although it is a long, it is a painless treatment, according to Dr. C. N. J. Gram. It should be noted that in applying escharotics to the sole of the foot or heel, it is important that the plantar surface should be turned directly upward, so that the application may sink in by gravity. The value of the loop or replaceable pad is manifest, but where this is not practicable, other adhesive pads to relieve pressure in many cases can be so arranged that the Verrucae may be treated and covered separately, thereby obviating the necessity of removing all the padding upon each occasion, if the case is frequently being seen. Some contrivance of this kind may add to the patient's comfort by saving too much drag on the skin. Where this process is not possible, consider the advantages of saponis adhesive instead of zinc oxide, as adhering less closely and so facilitating frequent removal.

VIBRATION. Mechanical vibration increases the volume of blood and lymph to a given area by acting upon the general metabolism. The increased blood-flow tends to overcome engorgement (congestion), and to remove products of inflammation. It is not indicated in severe inflammation, but in other cases if more especially applied to surrounding area will promote resolution and relieve pain.

Appendix I

CASE CARDS

For the purpose of case-card marking the advantage of condensing details is obvious. An effort is made here to record the further standardisation of such terms as are applicable as symbols, most of which are used in the London Foot Hospital, together with certain suggested modifications and additions, with the reasons for their adoption, arranged in alphabetical order:

Terms.	Symbols.
Advised	Ad
Blister	Bl
Bunion / Bursitis	B
Callosity	C
Corn	H
,, soft	HM
,, vascular	Hv
,, neuro-vascular	Hn
,, miliaria	H mil
,, minute pin point	H●
,, under nail	O H
,, or callous in sulcus	OP
Day or Days (number within a circle)	(1)
Equal Parts	50/50

Eczema	Ec
Feet, both	BF
Flexion	Fl
Foot, right	R
,, left	L
Hammer Toe	—|
Hallux Valgus	HV
Hallux Rigidus	HR
Hot Water	h.w.
Inflammation	In
Multiple	++
Nail, ingrowing	OC
,, hypertrophy, simple	OX
,, ,, with deformity	OGr
,, atrophy	O—
,, distrophy	OD
Osteoma	Ost.
Progressive or Good	—>
Referred	Rfd.
Retardation or Bad	<—
Septic	S/
Slight, or Less	—
Stop	//
Urgent (in red)	+
Verruca Pedis	VP
Weeks	Wks
With	c̄

The case-card would start with patient's name, address, source of introduction, computed (not necessarily asked)

age, and the date of visit. Next would come a statement of the pathological condition, area and particular foot involved, followed by treatment adopted and any particular dressing or pad ; finally, the period of return visit.

The principle of a ring round the number, as used in some of our general hospitals, is a quick way of indicating days.

Two specimen cases are given below :

No. 1.

Mr. T. Thomas, Rec. Mrs. Thomas. Age 60.
14, New St., W.2.

30.7.28 ℞ H 5 Ex. ⟵ In. T Iod M. Bc gauze and S wool, day. Ad Lotio Pl, nightly. (4)

3.8.28 ⟶ T Iod. Thin ZO grad. perf. SOS

In full, this would read :

Mr. T. Thomas, recommended by (computed)
14, New St., W.2. Mrs. Thomas. age 60.

30.7.28 Right foot. Corn on 5th toe external phalangeal joint. Bad case, inflamed, operated and dressed with weak tincture of Iodine. Boric gauze to area, with sheep's wool wound round, gave patient some of each for day use and advised Acetate of Lead lotion nightly till return in four days.

3.8.38 Improved. Cleared nucleus, treated, and applied weak tincture of Iodine and a thin

graduated Zinc Oxide felt adhesive with perforation. To come again when necessary.

No. 2.

Master A. Smith, Rec. Genl. Body. Age 13.
3 Smith Sq., W.C.

30.7.28 VP BF

R PMP 4. Ac. Mono.
OSG pad.

L Pl-Cal 2 do.
Thin ZO perf. (2)

1.8. Cont. Ad re h.w. ←— (2)

3.8. L reactn. H_2O_2, Subitine

R cont. Mono. (2)

5.8. R reactn. c. In H_2O_2 c h.w. 50/50, Subitine

L —> cont. Subitine (1)

6.8. BF —> Subitine (3)

9.8. —> Tinct. Benz. Co. (7)

16.8.28 All clear. Finis.

The above, in full, would read :

Master A. Smith, Recommended by (computed)
3, Smith Square, W.C. General Body. age 13.
30.7.28 Has Verruca Pedis in both feet. Right foot on plantar-metatarso-phalangeal area, 4 growths.

Applied Monochloracetic acid, covered with replaceable oval saponis graduated pad. Left foot, plantar-calcaneal, two growths, same treatment, with ZO felt cover. To return in two days.

1.8. Continued. Advised in respect to avoidance of hot water. To return in two days.

3.8. Left foot reacted to acid, cleaned out with Hydrogen Peroxide and dressed cavity with Subitine. Right foot, continued application of Acid Monochloracetic. To return in two days.

5.8. Right foot reaction with inflammation, foment of equal parts of sterilised water and Hydrogen Peroxide, followed by Subitine dressing. Left progressing, continued Subitine. Interval one day.

6.8. Progress both feet, continue Subitine. Interval three days.

9.8. Progress. Applied Compound Tincture of Benzoin. Interval seven days.

16.8.28 Appearance normal, no pain. Finished.

The ready-printed cards, which can be obtained from any of the supply depôts, have the outlines of both feet at various angles whereon the position of lesions can be indicated. In the absence of a printed card, the author has found a small rubber stamp giving the outlines of the feet (see opposite page), very useful, as it can be impressed on any sort of card, or on one's notepaper.

It has been more or less established by custom that the letter C should represent "Callosity," and the letter H (the initial of Helos) has been adopted, with various qualifying letters, to express a corn and its accompanying conditions, such as M for "Malakon" (Gr.), or "Molle" (Lat.) meaning "Soft."

"O," the initial of "Onyx," sufficiently symbolises the Nail, and with the letter H below it conveys the impression of a Corn under the Nail.

For hyperkeratinous conditions of the nail sulcus, which would indicate either corns or callous, the symbol OP seems adequate, as does OX for Onychauxis.

The curved condition with deformity is shown as OGr., the last letter being added in small type to avoid possible confusion with OC (Onychocryptosis). Nail atrophy is represented by the negative symbol O—, while various morbid conditions involving the nail-plate and bed, including Eczema, Onychomycosis, and other dystrophies, are generalised under OD, particular characterisation in these rare cases could be written in full.

VP clearly indicates Verruca Pedis. The foot-outline here is important to indicate the exact area for subsequent reference, especially after a long interval; further qualifications (except "multiple" which should be "++") could be written in abbreviated form as "circ" for "circumscribed"; "dif" for "diffused."

HV and HR, to indicate the qualifications of Hallux conditions, and Fl to indicate flexus, would seem to meet the case. With the great and the smaller toes, where

flexion brings direct hammer-like contact of the end of the toe with the ground, the sign —| conveys that particular contradistinction to mere flexion where the apex does not touch in that manner.

" Bunion " is rather an indefinite term and is subject to more than one interpretation (see Oxford Dictionary ; Hoblyn's Dictionary of Medical Terms) ; but as it has been generally accepted that a pathological condition in which the Bursa is involved, B seems to be a symbol which specifically indicates Bunion of the first metatarso-phalangeal area and bursal complication elsewhere.

In the case of bony enlargement, Ost would be commensurate.

Of the other symbols, S/ for sepsis seems to be distinctive of the important condition to be indicated. For " Progression " and its reverse the arrow-head is perhaps clearer than any other method of expressing these aspects. While " weeks " can be abbreviated, the hospital manner of indicating " days " is quick and clear. It seems less confusing to write " h.w. " in small type for " hot water," as the capital H is used for other purposes. The abbreviation " Rfd." could well connote " referred to doctor."

A list such as this undoubtedly could be improved upon or added to, but it is here set out by way of endeavour to co-ordinate abbreviations, and it will serve, at any rate, as a basis upon which to go.

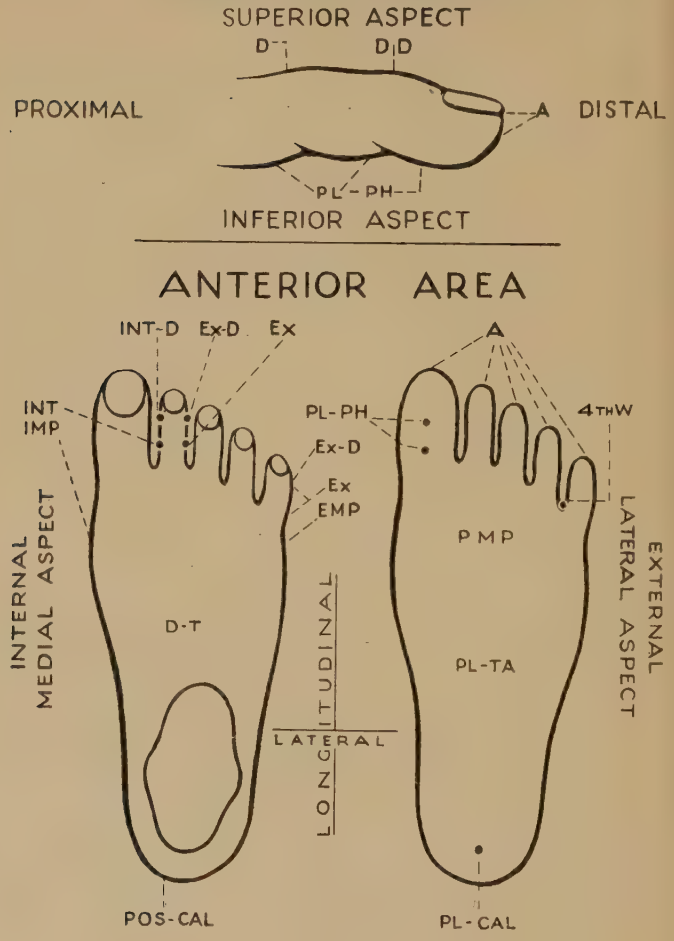
Appendix II

ORIENTATION OF THE FOOT

To some readers the necessity of an explanatory diagram of orientation of the foot may seem superfluous, but no doubt there are many others to whom some form of co-ordinated abbreviations would be of service in writing up details of cases. These abbreviations, of course, are subject to improvement, but at least they are an attempt to form some sort of system, and should the practitioner ever be in doubt as to an interpretation, the term could always be written in full. It is certain, however, that when once familiarity of these brevities is acquired, there would be a great saving of time.

Before planning some brief, compressed description of the positions of lesions the author found it most difficult to indicate for his own and for the guidance of others the exact area in certain parts of the foot, more especially the interdigital spaces. The exact area of interdigital spaces seems to need more careful definition than any other part, particularly if confusion is to be avoided. When, however, these spaces are divided into four, and the relative sides of each toe are specified, the spot can fairly well be identified. For instance, the external surfaces of the toes can be indicated by the term "external," abbreviated to Ex., and the internal aspect by Int.

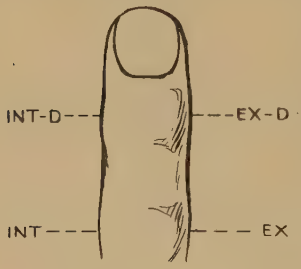
ORIENTATION DIAGRAM



Orientation Diagram Abbreviations

A	Apex.
D	Dorsal.
DD	Dorsi-Distal.
DT	Dorsi-Tarsal.
Ex	External.
Ex-D	External Distal.
EMP	External Metatarso-Phalangeal.
IMP	Internal Metatarso-Phalangeal.
Int	Internal.
Int-D	Internal Distal.
Pl-Cal.	Plantar-Calcaneal.
Pl-Ph	Plantar-Phalangeal.
PMP	Plantar-Metatarso Phalangeal.
Pl-Ta	Plantar-Tarsal.
Pos-Cal	Posterio-Calcaneal.
W	Web.

The covering membrane of the spaces or joining areas between the toes are perhaps best described as the web.



The furrow, always present at the line of demarcation between or under each toe, and often the site of fissures or minute corns, could be described as the "digito-lateral" "or digito-plantar" crease. (dig.-lat.; dig.-pl.]. The diagram indicates only abbreviations for the most usual positions; any more unusual area could be described in full, with markings on the foot-outline.

Outlines of the dorsal, plantar, lateral and medial aspects of the foot are now printed on many case-cards, and are used in our clinics. These are very useful for indicating all area-markings; but when writing to a fellow-practitioner, if more than the written descriptive terms are needed. The little rubber stamp to which reference has already been made, is handy to impress on one's notepaper.

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Brominadaris treatment

Aluminum Cl – 40 gr.
ZnCl – 5 gr.
HCHO 1 to 2 gr.
q.s. H_2O / 00 gr.